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**Westphal, H., A. Freiwald, T. Hanebuth, M. Eisele, K. Gürs,
K. Heindel, J. Michel. J. V. Reumont**

**REPORT AND PRELIMINARY RESULTS OF POSEIDON CRUISE 346,
MACUMA
- Modern atypical tropical carbonates in the upwelling off Mauretania -,**

**LAS PALMAS (SPAIN) - LAS PALMAS (SPAIN),
28.12.2006 - 15.1.2007.**

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Monika Bachur

Forschungszentrum Ozeanränder, RCOM

Universität Bremen

Postfach 330 440

D 28334 BREMEN

Phone: (49) 421 218-65516

Fax: (49) 421 218-65515

e-mail: MBachur@uni-bremen.de

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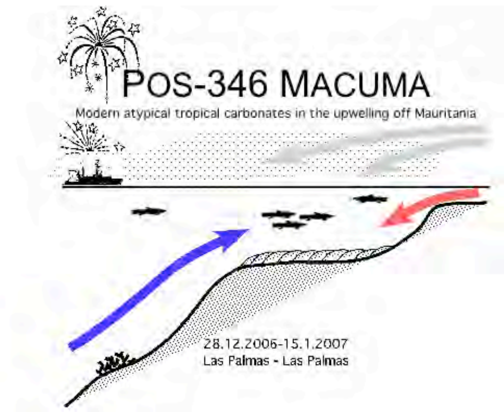
Cruise Report

Poseidon 346

MACUMA

Modern atypical tropical carbonates in the upwelling off Mauritania

Integrating carbonates, siliciclastics and deep-water reefs for understanding a complex environment



Las Palmas – Las Palmas
28.12.2006-15.1.2007

Edited by Hildegard Westphal
With contributions of André Freiwald, Till Hanebuth, Markus Eisele, Karl Gürs, Katrin Heindel, Julien Michel, Jonas v Reumont

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1. Abstract

Poseidon cruise 346 was a multidisciplinary expedition (sedimentology, biology, oceanography) aiming at better understanding the complex sedimentary system of the upwelling zone off Mauritania. The shallow Banc d'Arguin in the North of Mauritania and the continental slope West of Nouakchott were studied in order to address three main, interrelated objectives:

1. The high-nutrient tropical carbonates of the Gulf d'Arguin
2. The siliciclastic sedimentary record of the Banc d'Arguin and Mauritanian outer shelf
3. The deep-water reefs along the continental slope.

The sedimentary system of Banc d'Arguin is one of the rare examples in the modern world where high-nutrient yet warm waters host carbonate production. The siliciclastic record with sedimentation rates of up to 1 m per 1 ka allows for high-resolution paleoclimate reconstruction of the Late Holocene. The deep-water reefs are the southernmost known occurrence of such ecosystems in the Eastern North Atlantic. The aim is to decipher this complex sedimentary system and its climatic and oceanographic record.

Our work is integrated in a larger study on high-nutrient tropical carbonates (DFG; HW), Northwest African mud belts (DFG; TH), and comprehensive EU- and DFG-funded deep-water reef work (AF).

2. Participants

Name	Discipline	Institution
Eisele, Markus	Sedimentology	GeoB / RCOM
Freiwald, André	Paleontology	IPAL
Gürs, Karl	Paleontology	LANUSH
Hanebuth, Till	Sedimentology	GeoB / RCOM
Heindel, Katrin	Sedimentology	GeoB
Lackmann, Oliver	Technical Support	GeoB / RCOM
Max, Lars	Sedimentology	GeoB / RCOM
Peichert, Nadine	Sedimentology	GeoB
v. Reumont, Jonas	Paleoceanography	IFM-Geomar
Westphal, Hildegard*	*Chief Scientist*	GeoB
Abed, Jemal Ould	Observer	IMROP

GeoB	Department of Geosciences, Bremen University
RCOM	Research Center Ocean Margins, Bremen University
LANUSH	Landesamt für Natur und Umwelt, Schleswig-Holstein
IFM-Geomar	Leibniz-Institut für Meeresforschung und Zentrum für Marine Geowissenschaften, Kiel University
IMROP	Institut Mauritanien de Recherches Océanographiques et des Pêches, Nouadhibou, Mauritania

Fig. 1: Scientific team of RV Poseidon cruise 346 (JvR, OL, KH, ME, TH, HW, ML, KG, AF; NP not on picture).

*) FB 5, Geowissenschaften, MARUM-Gebäude, Leobener Straße, 28359 Bremen, Deutschland, hildegard.westphal@uni-bremen.de

3. Research Program

Research Objectives

The MACUMA research cruise dealt with the mixed carbonate-siliciclastic sedimentary system on the shelf and shelf slope off Mauretania (Banc d'Arguin and west of Nouakchott) (see map with cruise track, Fig. 1). MACUMA stands for Modern Atypical tropical Carbonates in the influence of Upwelling off MAuritania. With a latitudinal extension from 17° to 21° N, the study area is located in the tropical climate belt. It is however under the influence of the southward-directed Canary Current and an oceanic upwelling front, modifying the conditions in complex ways. The sedimentary system reflects this modification in that it lacks typical tropical sediment-forming elements such as zooxanthellate coral reefs or calcareous green algae.

The research objectives for the research cruise were:

1. Study of the modern atypical tropical carbonate sedimentary system of the Gulf d'Arguin;
2. Study of the deep-water coral reefs on the continental slope;
3. Study of the Quaternary climate evolution as recorded in the fluvial and eolian influence on the siliciclastic and carbonate sedimentary system of the Gulf d'Arguin.

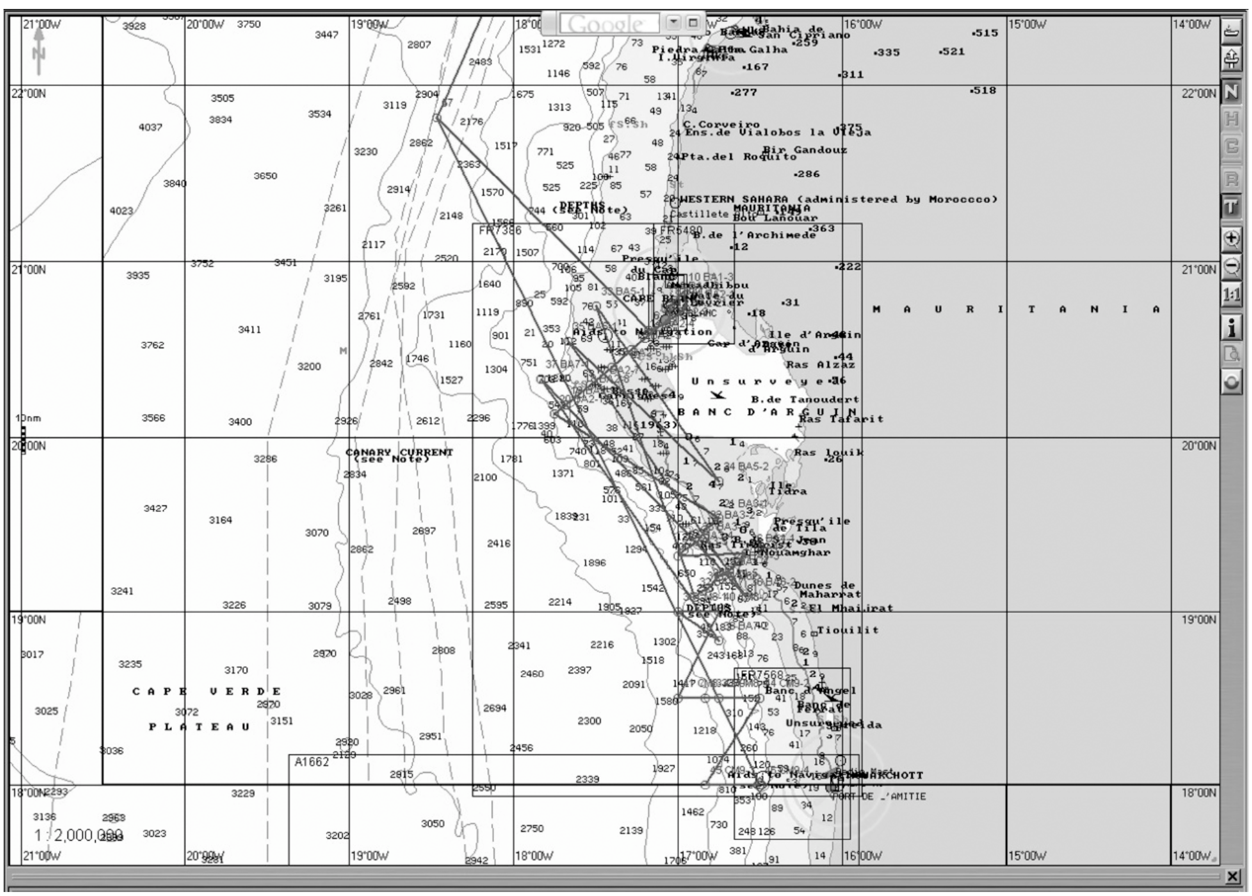


Fig. 2: Map of study area and cruise track.

(1) The carbonate sedimentary system of the Banc d'Arguin is a rare example of such atypical tropical carbonates. The study area was chosen, because in contrast to most other upwelling areas in the modern world, water temperatures on the shallow shelf are tropical and do not drop below the critical benchmark of 18°C. Nevertheless the waters are highly enriched in nutrients and are very productive. This combination of warm, nutrient rich waters, even though being uncommon in the modern world, might have been more widespread in the past. For reliable interpretation of ancient occurrences of such carbonate sediments, modern analogues need to be comprehensively studied. In addition, warm, nutrient-rich waters might become more widespread in the future as a result of global warming, thoroughly changing the carbonate producing systems and thus the physical behavior and morphology of shallow-water areas. One aim of the cruise was therefore to understand the complex reaction of the ecosystem and the resulting sedimentary system to such elevated-nutrient, warm waters.

(2) At the shelf slope, largely unknown deep-water coral reefs represent another peculiarity of the sedimentary system. These deep-water reefs compose the southernmost part of the irregular reef belt from northern Norway southward along the eastern Atlantic shelf slope. These deep-water reefs represent important fish breeding environments and therefore are not only scientifically but also commercially of high interest. One objective of the cruise was to study the faunal composition of these southernmost reef mounds and to compare them with the North-South trends along the North Atlantic deep-water reef belt.

(3) The mixed carbonate-siliciclastic system of the middle and southern Banc d'Arguin composes a unique high-resolution climate archive of the Quaternary (Hanebuth, in prep.). It records the interplay between eolian (dust) and fluvial influx of siliciclastic sediment through time. The aims of the cruise therefore included to answer the question whether the sedimentary record is continuous and allows for reconstructing Late Holocene climate evolution with a high resolution, and to reconstruct paleo-river activity in the study area that might have drained the hinterland into the Golf d'Arguin during the Holocene Climate Optimum.

The study area spans from the Baie du Lévrier east of Cap Blanc along the shelf bordering the Banc d'Arguin and further south to the deep-water reef mounds off Nouakchott. For all three objectives, examination of sedimentology, taxonomy, geochemistry, and oceanography is currently being undertaken. All three objectives will be studied as part of a comprehensive approach that will integrate the three aspects of the sedimentary system.

Scientific Program and Sampling Strategy

The scientific program was designed to provide

- Surface sediment sample coverage (box corer, grab sampler) of the shallow Baie du Levrier where possible with RV Poseidon;
- Surface sediment sample coverage (box corer, grab sampler) of the 20-30 m isobath along the western slope of the Banc d'Arguin;
- A small number of vibro-cores for these areas in order to extend the record of carbonate production back in time (vibro-corer needed for penetrating the coarse shell layers);

- CTD and water sampling in E-W transects off Banc d'Arguin for a better understanding of the influence of the different water masses on carbonate production on the banc;
- Gravity cores and vibro-cores of the mud wedges off the southern Banc d'Arguin (80-100 m water depth) in order to complement the existing data set (Hanebuth, subm.) for climate reconstruction of the late Holocene;
- Gravity cores and surface samples of the deep-water reef mounds west of Nouakchott for a first faunistic and sedimentary study of these southern deep-water reefs of the North-Atlantic deep-water reef chain;
- CTD and water sampling west and on the deep-water reef mounds to gain first information on the oceanographic conditions related to these mounds.

4. Cruise Narrative

H. Westphal

The RV Poseidon left the harbor of Las Palmas on the 28th at 9:00 local time and started the transit to the study area off Mauritania. The team assembled geologists and paleontologists from University of Bremen, University of Erlangen, and the Landesamt für Natur und Umwelt (Schleswig-Holstein). Additionally, a guest scientist from IMROP (Nouadhibou, Mauritania) was on board the vessel.

On the 30th we had arrived at the study area and at 22:45 the Poseidon was on the first station where a CTD cast was carried out in 1550 m water depth west of the Banc d'Arguin. The temperature and water distribution of the water column clearly reflected the Canary Current. Work on the shelf off the Banc d'Arguin was commenced on the 31st, when at five stations box cores and gravity cores were taken. This southern part of the shelf is characterized by a fine-grained mud wedge (Timiris Mud Wedge, TMW) in roughly 80 m water depth that is composed of dark sediment with coarse carbonate shells. During the night from Dec. 31st to Jan. 1st an echo sounder section was measured for reconnaissance of the shelf morphology that is disrupted by submarine canyons.

Coring work on the 1st of January continued ocean-ward of the TMB. The sediment recovered by box coring and gravity coring again was very fine-grained and dark and had a pronounced H_2S smell. In a water depth of 370 m we found fragments of the deep-water coral *Madrepora* as well as solitary corals. Later that day we started a grab sampler profile northward along the 20 m isobath of the Banc d'Arguin that should add up to some 20 samples along the entire N-S extension of the Banc during the cruise. Even in this shallower water depth, in the northern part of this profile the sediment was dark colored, however well-sorted quartz sand was identified as major component in some samples, pointing to possible submerged eolian dunes. The sediment was rich in worm tubes and live worms and H_2S smell. The high productivity of the area was also manifested in considerable concentrations of otoliths in the sediment and also in the fact that several box cores brought live fish on deck.

During the night to the 2nd of January, wind strength increased considerably to up to Wind Force 8 (Harmattan; see below). Therefore the planned CTD stations were cancelled. In an attempt to mitigate the effects of the storm, we moved closer to the coastline near Cap Blanc in the North of the Banc d'Arguin. Shortly after noon the winds ceased and grab sampling and box coring of the shallow waters of the northern Banc revealed clean, lose, and coarse carbonate sands and shell deposits. Two attempts to core this coarse carbonate sediment with the vibro-corer were unsuccessful due to technical problems. During the night, five CTD casts were measured in a section from the northern Banc to the open ocean. The same stations were sampled by means of box corer and gravity corer the next day (Jan. 3rd), revealing dark fine-grained sediment. On the surface of the box cores were abundant live ophiurids and crinoids. In the night, the 20 m isobath profile was continued up to off Cap Blanc with 10 grab sample stations. The sediment showed a general trend to cleaner, carbonate-rich, coarser sediment northward and finer, dark sediment southward. For one station off Cap Blanc, the sediment was dominated by well-sorted quartz sand reminiscent of desert sand.

On the 4th of Jan. we continued our work on the southern Banc d'Arguin in a presumed paleo-valley setting (Arguin Mud Wedge; AMW). Due to rough conditions, the vibro-corer could only be used after noon; during the morning, box coring and grab sampling was undertaken. During the night, CTD casts were measured, and on the 5th of Jan, several grab samples were taken along the 20 m isobath profile to increase data density and to wait for calm conditions in order to attempt additional vibro-coring in the paleo-valley setting. Three cores were successfully recovered during the afternoon.

In the evening of the 5th of Jan., we left the Banc d'Arguin and headed south for deep-water coral targets South of Nouakchott. During the transit, several CTD casts were measured. The Poseidon arrived in the coral mound province (Banda Mounds) in the morning of Jan. 6th. In sight of the Chinguetti Oil Field we spent the entire day with reconnaissance by means of echo sound in order to exactly locate the coral mounds and gain information on their morphology. Reflections typical for coral mounds were observed with steep slopes and soft reflectors sitting on sharp basal reflectors. The echo sounder profiling, however, was strongly disturbed by large herds of dolphins. During the following night, CTD casts were measured along the Banda Mound chain. On Jan 7th, a series of box cores and gravity cores was recovered from top mound and slope locations. Even though the samples were very rich in deep-water corals, only one live *Lophelia* was recovered. During the night, grab sampling was undertaken to gain samples from a transect towards the coastline. Box coring and gravity coring of coral mounds was continued on Jan. 8th again recovering abundant deep-water corals (*Lophelia*, *Madrepora*, and *Dendrophyllia*), and the deep-water reef bivalve *Acesta*.

During the night, the Poseidon proceeded to the northern Timiris Mound province. Echo sounder profiles were carried out and a series of CTD casts were measured. On the 9th of Jan. in the morning, box cores and gravity cores of the Timiris Mounds were recovered. Then the vessel left the coral mound provinces and returned to the southern Banc d'Arguin, measuring two CTD profiles along the way. In the afternoon, East of the TMB, a dinghy was launched in order to gain sample material from the shallow Banc d'Arguin. The bathymetry in this southern part of the Banc is rather abrupt, and the dinghy only went for some 1.5 nm before reaching a water depth of roughly 3.5 m. Currents were strong, and due to the extremely calm sea, morphological edges of the shallow sea floor were clearly visible. Sediment was dredged with a simple bucket, revealing the first occurrences of red algae encountered during this cruise. During the night, a CTD cast was measured seaward of the dinghy station, and a series of grab samples were taken East of the TMB as the southernmost extension of the 20 m isobath profile along the edge of Banc d'Arguin.

In the morning of the 10th of Jan., the Baie du Levrier was reached, the northernmost part of Banc d'Arguin, sheltered East of Cap Blanc. The sea was calm and it was slightly raining. A series of grab samples was taken in 10-20 m water depth. The sediment was clean carbonate sand dominated by bivalves. Two attempts were made to recover vibro-cores. The first vibro-corer station was located in the entrance of Baie du Levrier in 12 m water depth. Due to the strong tidal currents, the station was planned for stillwater at 10:00. The corer recovered 5 m of coarse carbonate shell sediments. At the other station slightly Southwest of the tip of Cap Blanc, the vibro-corer hit a hard surface and was damaged.

During the night, CTD stations were measured along a section in westward direction off Cap Blanc down to water depths of 498 m. In the morning of the 11^{th} of Jan., the weather was humid and rainy. The shallower of the CTD stations of the night were targeted for sediment sampling; grab sampling and box coring took place while the vibro-corer repair was completed. A vibro-core with well-sorted fine sand, shell rich sediment was recovered. As the sea got rougher, the next vibro-corer stations were abandoned, and grab sampling and box coring were attempted. After the weather continued to deteriorate and reached Wind Force 9, at 11:00 all work had to stop. The weather forecast predicted continuing poor conditions, therefore the Poseidon started her transit back to the port in Las Palmas where it arrived on the 15^{th} of Jan. at 9:00 local time.

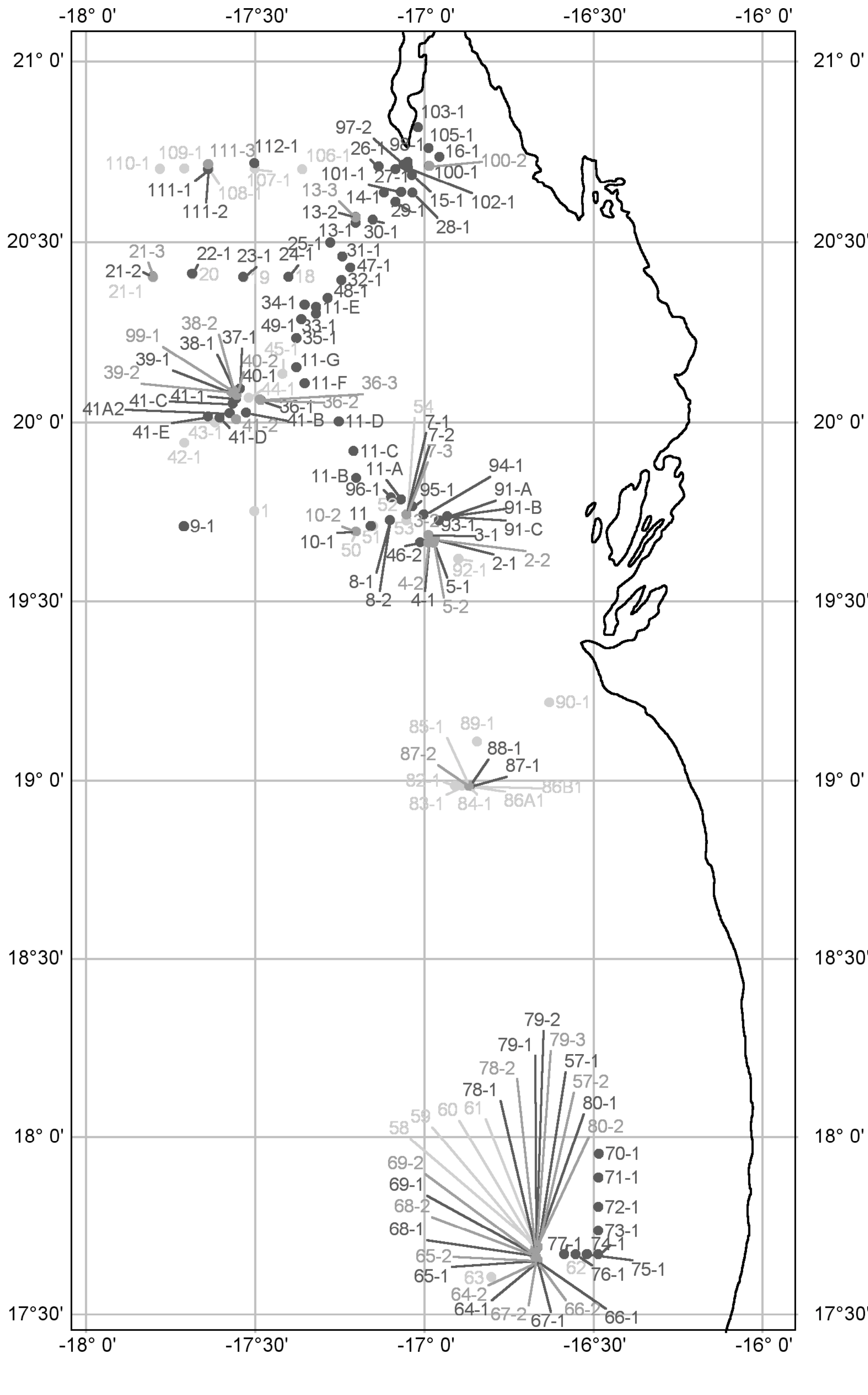


Fig. 3: Map of the stations during cruise POS 346. light grey: CTD and water samples; black: grab samples and box cores only; dark grey: gravity cores or vibro-cores (plus grab samples and/or box cores).

5. Scientific Equipment

M. Eisele, K. Gürs, T. Hanebuth, K. Heindel, J. v. Reumont, H. Westphal

List of total number of operations

Equipment	Number of stations/sections/profiles	Successful runs
Echo sounder sections	4	4
CTD casts / rosette	34	32
Van Veen grab	62	59
Box corer	35	31
Gravity corer	19	19
Vibro-corer	12	8

Table 1: Number of stations per tool; detailed list of all stations see appendix.

Giant Box-Corer

The Giant Box-Corer (50 cm x 50 cm x 50 cm) was a main sampling tool for surface sediments (Fig. 4).

Fig. 4: Giant Box-Corer used during POS 346. Left: Box corer with core is brought back on deck. Right: Sub-sampling of the box core with core liners.

The box corer was run at a 35 stations, a total of 34 box cores were recovered. The recovery was strongly dependent on the sediment (grain size), whereby fine-grained sediment resulted in cores of 40-50 cm length. Box cores taken in coarse shell sediments typical for the shallow water settings of Baie du Levrier only recovered 10-30 cm. The coarse layers hindered penetration of the box corer into the sediment. Sediments from sites situated in deeper water settings and in the southern part of the Banc d'Arguin were dominated by silt-sized grains and showed a recovery of 40-50 cm.

The on-board protocol for the box cores included description (color, grain sizes, fauna, sediment structures) and sampling of the surface. The live macro-fauna was collected and preserved in ethanol (30 %) for taxonomic studies. Two 200 cm^2 sub-samples were taken for micropaleontological studies. One of these was stained with a solution of rose Bengal (1 g in 1 l of ethanol) in order to allow distinction of live micro-fauna. Two cores were taken from each box-core. The vertical section was then described, and bulk samples were taken from each visible layer. The remaining sediment was wet-sieved layer by layer with mesh-sizes of 1 cm and 2 cm. The sieved sediment fractions were dried. Digital photography of the surface, the vertical section, and the coarse fraction were taken for each box core.

Van Veen Grab

The grab sampler (Fig. 5) was used for exploratory sampling prior to employing the various corers, and for surface sediments in comparably high resolution, and as reconnaissance tool for gaining information on sediment types before operating box corer, gravity corer, or vibro-corer. For high-resolution surface sampling, the grab sampler was mainly used during the nights. A total of 62 grab sampling stations were run, 59 of which recovered surface sediment. The grab sample was documented photographically and then sub-sampled (three bulk samples, two syringe samples, live fauna in ethanol). The remaining bulk sediment was sieved with mesh widths of 1 cm and 2 cm.

Fig. 5: Van Veen Grab used during POS 346.

Gravity Corer

The Gravity Corer was used where the van Veen grab indicated soft and fine sediment conditions, that is, at sites in the South of Banc d'Arguin and at deeper sites. A 6 m core barrel 6 m was used with a weight of 1.800 kg. A total of 19 gravity cores stations were run, all of which recovered cores. An average of 466 cm core length (215-586 cm) was recovered. The cores were cut in one-meter segments and were opened in the laboratory in Bremen. The gravity cores from Banc d'Arguin are stored at Bremen University, the gravity cores from the deep-water coral reef stations are stored at Erlangen University.

Vibro-corer

At stations judged unsuitable for using the gravity corer (danger of damaging the core barrel), the vibro-corer was used (VKG-5 produced by Th. Schmidt, Rostock, Germany; Fig. 6). It proved successful for recovering shelf sediment successions consisting either of homogeneous coarse-grained sediment, or of fine-grained sediment with interbedded coarse layers. Expected coarser sediments included paleo-coastal deposits, thick shell horizons, and paleosols that cannot be penetrated by gravity corers but can be successfully cored by vibro-systems.

The vibro-corer provided a maximum core length of 500 cm and had a diameter of 10 cm. With the available 175-m long electrical cable, which is run parallel to the steel wire by hand, coring in a maximum water depth of 140 m was possible during calm weather and wave conditions.

At a total of 12 stations the vibro-corer was run, and cores were recovered at eight stations. Technical problems and recurring rough conditions prevented a more frequent usage, however where successfully run, the vibro-corer had extremely high and complete recovery. An average of 454 cm of sediment was recovered (284-491 cm). Once the cores were on deck, the plastic liner was cut into 1 m segments, closed with caps and labeled according the scheme applied for all GeoB cores that are stored at the University of Bremen (MARUM).

Fig. 6: Vibro-corer VKG-5 on the way down.

CTD and Rosette

The deployed CTD system was a Sea-Bird "SBE 9plus" underwater unit in combination with a Sea-Bird "SBE 11plus" deck unit. Additionally the underwater unit was equipped with a dissolved oxygen sensor and mounted in the bottom part of a Sea-Bird "SBE 12 Carousel Water Sampler" capable of holding 12 water-sampling bottles. The CTD oxygen data have not been validated onboard with water samples e.g. by iodometric oxygen titration. Therefore the oxygen sensor is considered unreliable.

6. Preliminary Results

6.1. Carbonates of the Gulf d'Arguin

H. Westphal, K. Gürs

Scientific targets

Carbonate production and deposition in high-nutrient tropical settings is rare in the modern world, and the northern part of Banc d'Arguin is probably the occurrence with the highest nutrient concentration. Elevated nutrients are caused not only by the upwelling system west of the Gulf d'Arguin, but also by high eolian influx of physically weathered dust. The carbonate deposits of Baie du Lévrier, the northernmost tip of the Banc d'Arguin have been described by Koopman et al. (1979), however a comprehensive study of the sediment-producing ecosystem was still lacking. In particular, this topic has high relevance as it can be expected that as a result of current global change, such high-nutrient, warm-water systems will become more common.

During Poseidon 346, within the shallow-water carbonate objectives we concentrated on (see Fig. 7):

- Surface sediment sampling in the Baie du Lévrier (grab sampling, box coring) for describing the modern sedimentary and ecological system;
- Surface sediment sampling along the 20-30 m isobath from Cap Blanc to Cap Timiris for studying the N-S trend from high-carbonate sediments (exceeding 90% carbonate contents) to sediments with as little as 40-50% carbonate;
- Vibro-coring of the coarse, pure carbonate sediments in order to gain information on environmental change through time.

Sampling was extremely successful, and a large data set was collected. One vibro-core was recovered in the Baie du Lévrier (Station 100-2) that is composed of coarse shell debris (Fig. 8). Because of the very shallow water depths (most parts have less than 10 m water depths), the vast shoals of the Banc d'Arguin could not be included in the sampling strategy. One sample was taken during a zodiac excursion on the southern shallow Banc d'Arguin, and one sample was taken by means of a bucket dredge.

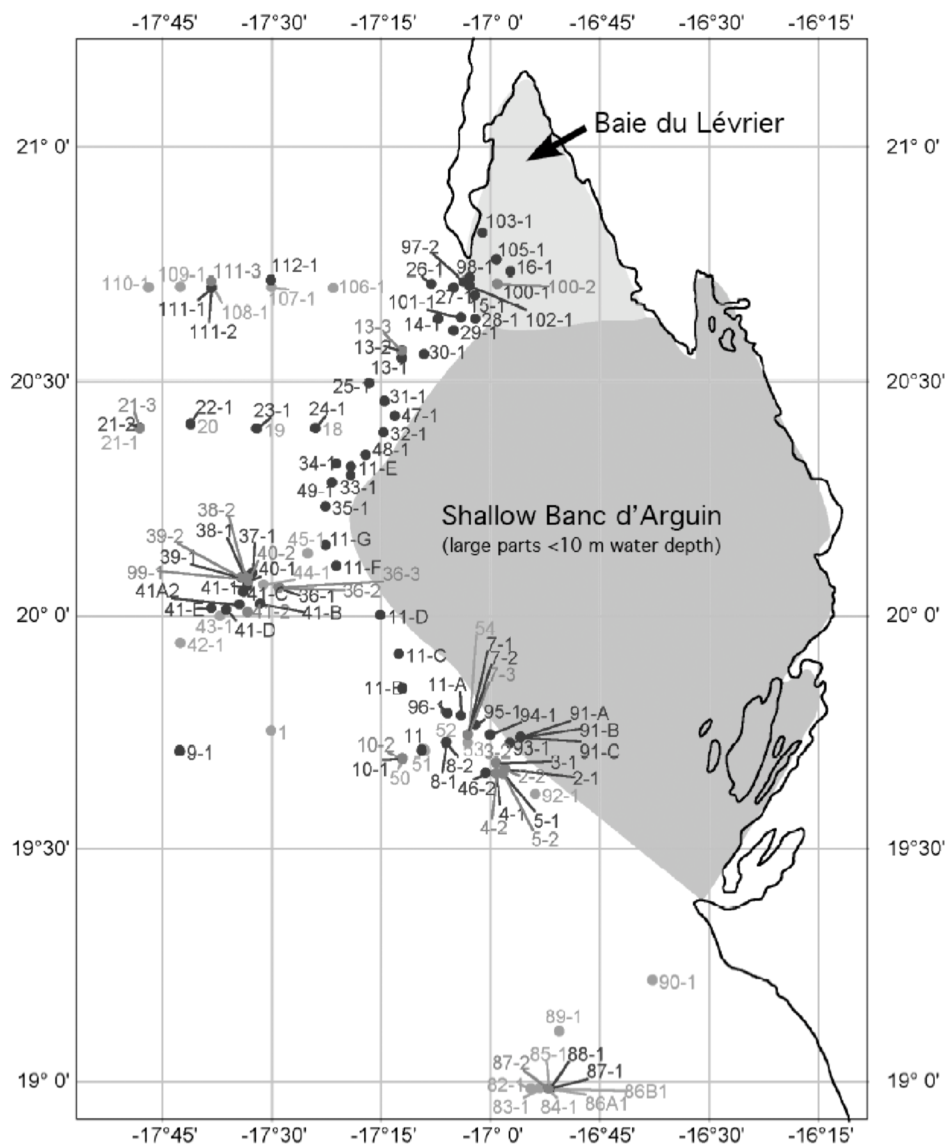


Fig. 7: Sample locations on the Banc d'Arguin and its slopes.

First results

Shallow-water carbonates of the Banc d'Arguin

A clear trend in composition of the surface samples splits the Banc d'Arguin in three separate parts:

(1) The Baie du Lévrier and the northern part of the 20-30 m isobath section with clean, coarse carbonate sands;

(2) An area West and South of Cap Blanc, where clean quartzose sands are admixed that are interpreted as reworked dune sands;

(3) The southern part of the 20-30 m isobath section with large amounts of eolian silt admixed. These southern samples are overall fine-grained, poorly ventilated, black sediments;

(4) A fourth part is indicated by the dredge sample that consisted of skeletal sand with the only occurrence of red algal remains. However, to characterize this very shallow carbonate sedimentary realm, more systematic sampling would be required.

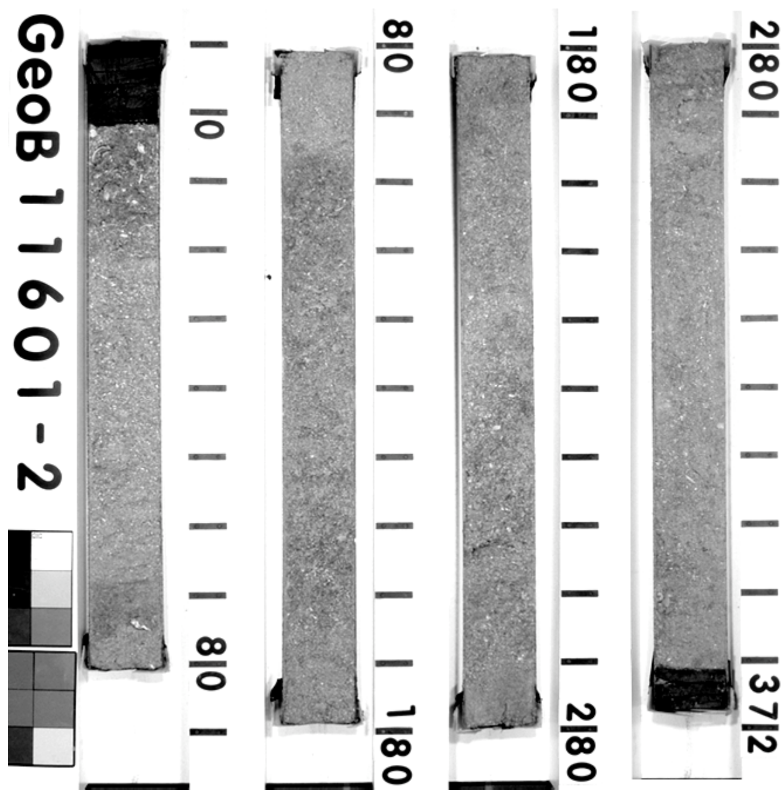


Fig. 8: Core GeoB 11601-02 (Station Pos 100-2) composed of coarse shell debris showing an overall coarsening-up trend.

Fig. 9 A: Coarse Fraction (> 2cm) from box core GeoB 11534-01 (Pos 346-34-1) from the northern part of Banc d'Arguin (water depth 29 m).

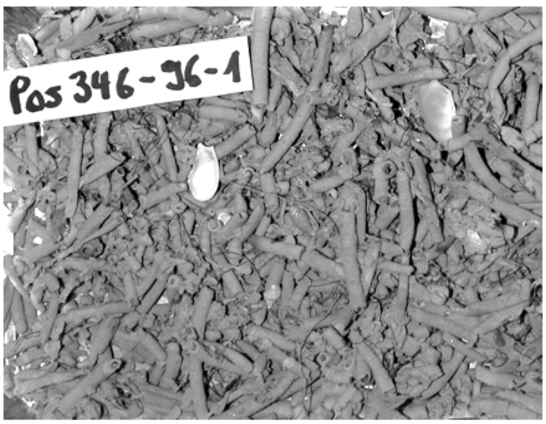


Fig. 9 B: Coarse Fraction (> 2cm) from grab sample GeoB 11596-01 (Pos 346-96-1) from the southern part of Banc d'Arguin (water depth 55 m). Dark elongated particles are worm tubes.

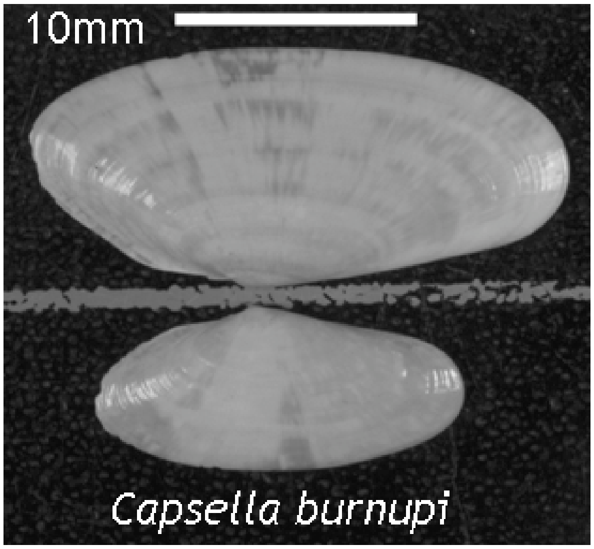
Fig. 9 C: Coarse Fraction (> 2cm) from grab sample GeoB 11508-01 (Pos 346-8-1) from the southern outer part of Banc d'Arguin (water depth 129 m). Abundant fish remains demonstrate high biological productivity.

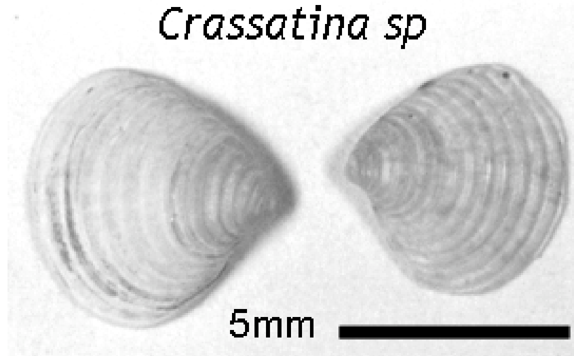
Fig. 9 D: Coarse Fraction (> 2cm) from grab sample GeoB15597-01 (Pos 346-97-1) from the Baie du Lévrier (water depth 11 m). Sample is strongly monospecific with abundant *Capsella burnupi* (Sowerby, 1894).

The carbonate sedimentological assemblages reflect the high-nutrient situation of the study area. Zooxanthellate corals and green alga that are typical of oligotrophic tropical settings are absent from the samples collected. Generally, the carbonate fraction of the samples is dominated by mollusk remains (Fig. 9 A-D). The sediment is classified as heterozoan association sensu James (1997) or as foramol association sensu Lees and Buller (1972), clearly pointing out the atypical character of these tropical carbonates. The eutrophic character is manifested by high concentrations of fish remains (Fig. 9 C) including otoliths, and towards the south in the finer-grained deposits, by abundant worm tubes (Fig. 9 B).

From the carbonate grain composition of the samples, two areas are distinguished; (1) the northern part with the Baie du Lévrier and the northern part of the 20-30 m isobath section with abundant bivalves and distinctly less abundant gastropods (Fig. 9 A and D); (2) the southern part of the 20-30 m isobath section where worm tubes are dominant in many samples (Fig. 9 B).

In the Baie du Lévrier, some samples are highly monospecific with a high portion of the bivalve *Capsella burnupi* (Sowerby, 1894; Fig. 9 D and Fig. 10 A). This bivalve reflects the upwelling conditions in the study area. However, the sediment clearly has a warm-water, tropical character with the bivalve *Crassatina sp.* (Fig. 10 B) and gastropods like *Prunum annulatum* (Reeve, 1865) and *Marginella desjardini* (Marche-Marchad, 1957, Figs. 10 C and D) demonstrate that tropical water temperatures prevail.

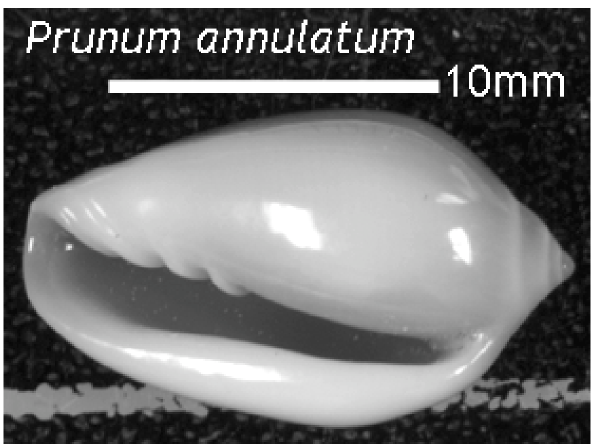


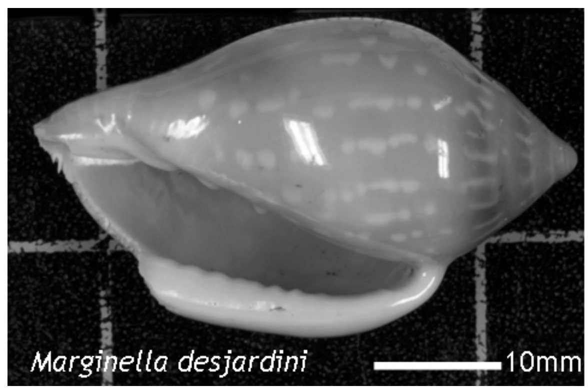


A B

Fig. 10: Close-ups of environmentally significant mollusks (photographs by V. Diekamp, Marum, Bremen)

C D





Sedimentation and faunal communities of the outer shelf and bathyal

Some box cores and grab samples were taken on the outer shelf and bathyal slope West of the Banc d'Arguin and were complemented by grab samples West of Nouakchott (i.e. East of the Banda Mound Province). Aim was to examine the sedimentation outside the shallow inner shelf and the influx of upwelling on the faunal communities. A total of 12 box-cores and 18 grab samples were taken in water depth of below 50 m to 604 m.

West of the Banc d'Arguin all samples from the outer shelf consist of fine sand to silt interpreted as eolian dust from desert storms. Bathyal samples are composed of silts to clays and are of dark greenish grey colors. All samples are rich in shell debris. The outer shelf samples are dominated by bivalves of the family Telluride and the gastropod species *MacLean elate*. Deposit feeders of the Turritellidae (gastropods) are common. Similar associations are found for example in the Alboran sea of the western Mediterranean, where strong upwelling occurs, or in Middle Miocene deposits of the North Sea Basin (Janssen, 1984). Such associations indicate eutrophic conditions; for the North Sea Basin caused by freshwater influx (which for the Mauritania Shelf with its desert hinterland clearly is different). Despite high proliferation of organic matter no signs of oxygen depletion are present in the samples. Exclusively tropical gastropods including *Clavatula sp*. or *Marginella spp*. confirm the tropical character of the sediments.

Stations Pos346-7 to Pos346-10 form a transect perpendicular to strike from shallow to deep water in the Southern part of the Gulf d'Arguin (Fig. 11):

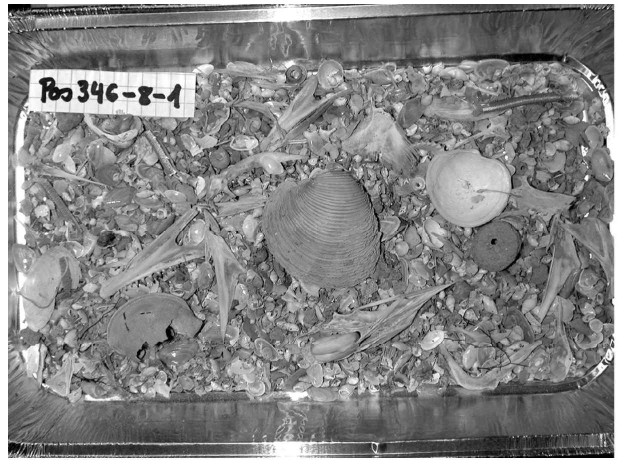
The communities of Station Pos346-7 (Fig. 11 A) and Pos346-8 (Fig. 11 B) match with other outer shelf samples. Samples from Stations Pos346-7 to Pos346-9 contain relatively large amounts of allochthonous shallow water (intertidal) mollusk species mixed with the autochthonous fauna. Core Pos346-9-1 from a water depth of 939 m (GeoB11509-01; Fig. 11C) in addition contains rock fragments and deep-water corals of the species *Lophelia pertusa*; cf. Chapter 6.3). This erratic fauna is fundamentally different to the fauna described from the shores of the Banc d'Arguin (own unpublished data from samples from Tidra Island; Wolf et al., 1993). Thus it appears not to be transported to these sites from the East but could derive from rocky shoals known from the southern part of the Banc d'Arguin) and transported downhill by a northward directed countercurrent.

The community at Station Pos346-10 represents a typical bathyal community. Specialized carnivorous bivalves of the Cuspidariidae, deposit feeding bivalves of the Nuculanidae and the genus *Abra* as well as the deposit feeding gastropods including *Callumbonella suturalis* (Philippi, 1836) demonstrate the deep water character while no signs of anoxic or dysoxic conditions are present. In contrast, anoxic to dysoxic conditions are apparent in samples from Pos346-21-2 (GeoB11521-02; water depth 563 m) where Thyasiridae and *Lucinoma borealis* (Linnaeus, 1767) occur, both hosting chemosymbionts with the ability to oxidize sulfides (Fig. 11E).

The outer shelf off Nouakchott shows a contrasting picture. An isobathic section East of the Banda reefs in a water depth of about 150 m (Stations Pos346-71 to Pos346-75) reveals a strongly muddier facies where worms and Tellinidae are the dominant faunal elements. The fauna is diverse and particularly rich in deposit feeders. Solitary corals occur, and *Amyclina elata* (Gould, 1845) is virtually absent. In a transect perpendicular to strike towards the Banda reefs (Stations Pos346-75 to Pos346-77) the fauna is progressively impoverished downslope until the coarse fraction consists only of worm tubes, planktonic gastropods, and sparse shell fragments. This could imply stagnant water in the current shadow of the deep-water reefs.

In summary, the sediments from the outer shelf off the Banc d'Arguin reflect conditions influenced by strong upwelling. The environment is eutrophic, yet well oxygenized, and water temperatures are tropical. Conditions are well oxygenized in bathyal depth, whereas the outer shelf off Nouakchott, East of the Banda Mound Province, in contrast shows more stagnant eutrophic conditions. The upper bathyal of the slope in this area is nearly anoxic in the shadow of the deep-water reefs.

A



B

C

D

E

Fig. 11: Coarse fractions (> 2 cm) of samples from banc margin-slope transect at Southern Gulf d'Arguin. 0.5 cm squares on labels for scale. (C) Station Pos346-9: debris of deep-water coral *Lophelia pertusa*. (E) Station Pos346-21: bathyal community with chemosymbiontic affinity indicating dysoxic to anoxic conditions.

Further analytical work

Ongoing and planned analytical work includes

- Taxonomy of mollusks and other calcareous fauna
- Age dating by the radiocarbon method
- Grain size analysis
- Carbonate contents
- Stable isotope measurements on carbonate shells (incl. planktic foraminifers)

This work will lead to a comprehensive description of the ecological and depositional system of this high-nutrient tropical carbonate setting. This study will be the first of its kind systematically describing atypical tropical carbonates in terms of sedimentology, taxonomy, and geochemistry.

Study of the cores will add the time dimension, potentially revealing information on the development of upwelling in the past few thousand years. The study will also lead to a better understanding of the complex oceanographic situation with various water masses and strongly seasonal currents on this broad shallow-water area of the shelf of Mauritania. Integration with the siliciclastic data will add information on the climatic development in the hinterland. Thus, this study will add to the understanding of the coupled marine-terrestrial system of North-West Africa.

6.2. The Mud Belt of Banc d'Arguin

Till Hanebuth

Scientific targets

Two scientific targets were the focus of the mud belt objectives during Poseidon 346; the Late Holocene climate archive recorded in the mud belt (Fig. 12), and the question of the presence of a paleo-river draining into the Golf d'Arguin during the Holocene Climate Optimum.

(a) Mud belt sediment of Banc d'Arguin as continuous archives for the reconstruction of the Late Holocene climate history

The Banc d'Arguin is located off the Sahara desert. During the mid-Holocene Climate Optimum, the Sahara "Green mode" was characterized by a monsoonal precipitation rate several times higher then today and a comparably dense vegetation cover. Since then climatic deterioration has occurred in distinct steps with temporary recourses to more humid conditions until some two thousand years ago when modern hyper-arid conditions have finally established. This general development is known from different marine and terrestrial archives, however the evidence comes non-continuous or patchy records.

Mud belts that are usually located in certain physiographical positions in a sedimentary shelf system in many cases have the potential to continuously record the environmental history with very high temporal resolution. This potential is, however, rarely used up to now. The mud belt off Cap Timiris (in the following termed Timiris mud wedge) was first cored in 2005 (RV Meteor cruise M-65/2: Krastel et al., 2006) and current analyses (T. Hanebuth) give evidence that the Late Holocene is recorded in remarkable detail. Additionally, a second fine-grained wedge-like depocenter was discovered in an area around 20° N termed the Arguin mud wedge. (Fig. 12)

In order to expand the existing record back in time, during Poseidon 346 the seaward margin of both mud wedges along the mud belt was sampled. A series of surface samples taken around the mud belt was taken in order to study why the mud belt has such a stable position through time.

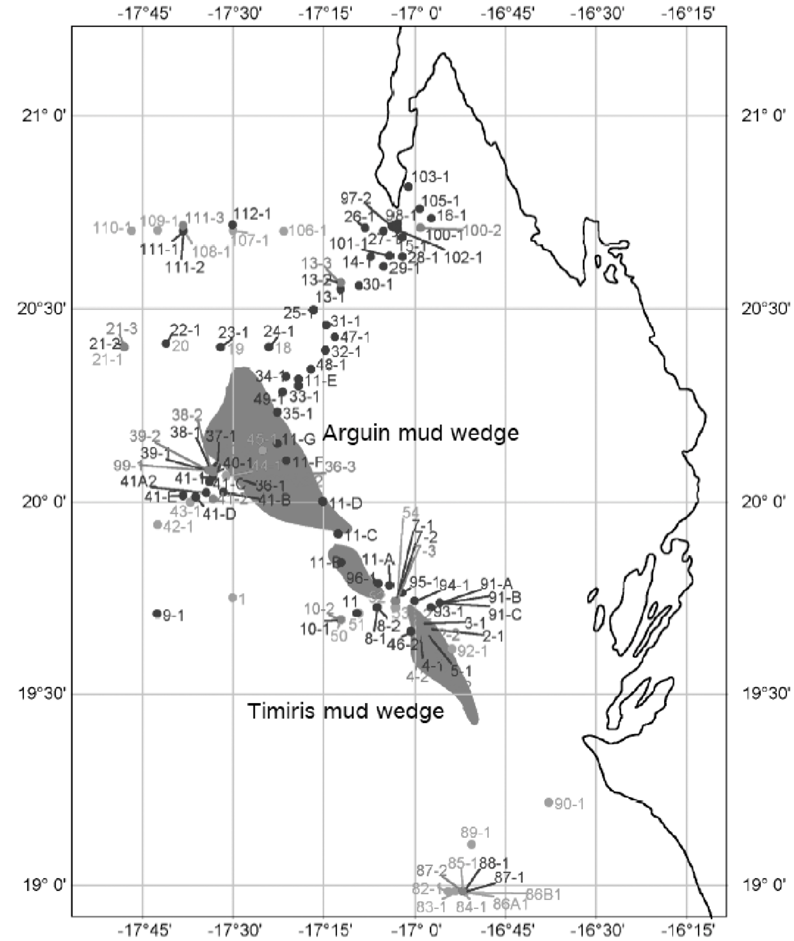


Fig. 12: Position of the mud belt consisting of the Arguin mud wedge and the Timiris mud wedge.

(b) Question of presence of a paleo-river during the Holocene Climate Optimum draining into the Golf d'Arguin

The existence of an extensive and deeply incised canyon system just off the Golf d'Arguin, together with the fluvial valley systems in the hinterland as visible on satellite images, and a number of endemic species from coastal waters, seem to indicate that a riverine supplier has been active in earlier, humid times. The Mid-Holocene green period of the Sahara would be a possible time interval of fluvial activity. However, this has not been proven to date because terrestrial and shelfal deposits disappear rapidly by microbial decay, widespread erosion, or are possibly overlain by thick sand seas and sediment sheets. Indirect and debatable evidence is given by marine proxies and is only related to grain size.

Subbottom structures on the outer shelf off the Golf d'Arguin, discovered during an earlier cruise (RV Meteor cruise M-65/2: Krastel et al., 2006) show erosional features in 80 m water depth that could be interpreted as of fluvial origin. Alternatively, they could represent a paleo-shoreline. During Poseidon 346, the material infilling these erosional structures was a prime target in order to answer the question of the origin of these sediment packages. In contrast to two earlier attempts employing a gravity corer, coring with the vibro-corer during Poseidon

346 resulted in complete recovery even in sediment succession with intercalated coarse-grained layers.

Results from the middle part of the Banc d'Arguin (TH)

(a) Mud-belt depocenters

Four sediment cores were taken from the Timiris mud wedge and 2 from the Arguin mud wedge. The sediments are composed of grayish homogenous silts that promise to represent a continuous succession that covers the past several thousand years. Core locations are placed at different positions at the margin of the depocenters, and dating will elucidate how these sediment bodies have evolved through time.

A zodiac trip towards one of the shoals at the margin of the Banc d'Arguin was undertaken to get an idea about the reasons why the Timiris mud wedge has developed just beyond a morphological step on the seafloor. A seafloor surface sample was composed of coarse-grained carbonate sand to gravel and supports the suggestion that a hydrological jump is responsible for massive grain-size separation in this area.

(b) Paleo-shore vs. paleo-valley

The five stations positioned on erosional features were chosen following shallow sediment acoustics from former research cruises. These cores are composed of a surficial sand facies overlaying fine to middle sands. These sands are interrupted by a massive shell bed showing grain-size sorting, good rounding and a faint fining-upward trend. Tentatively this shell horizon is interpreted as remnant of a paleo-coastline. Regarding the water depth of 80 m, they could be some 14 thousand years old – as a first preliminary estimate.

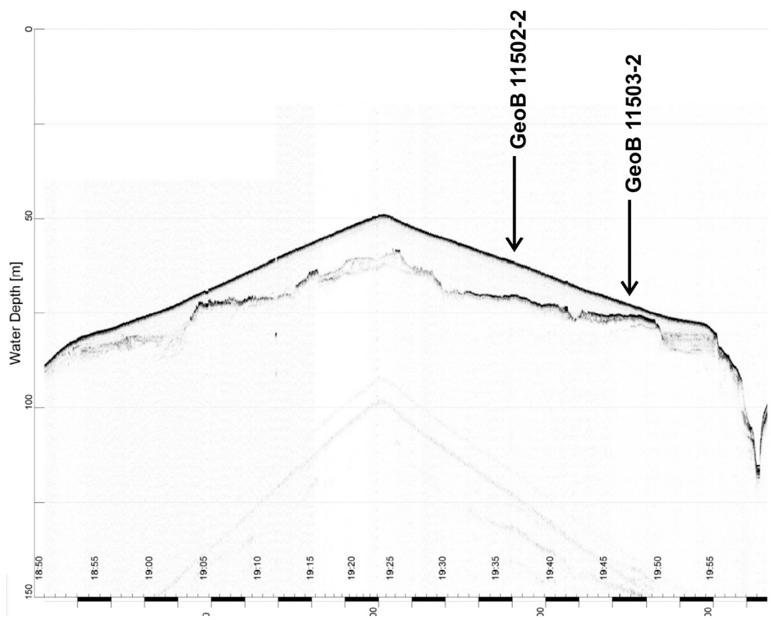


Fig. 13: Position of vibro-cores in the Timiris mud belt.

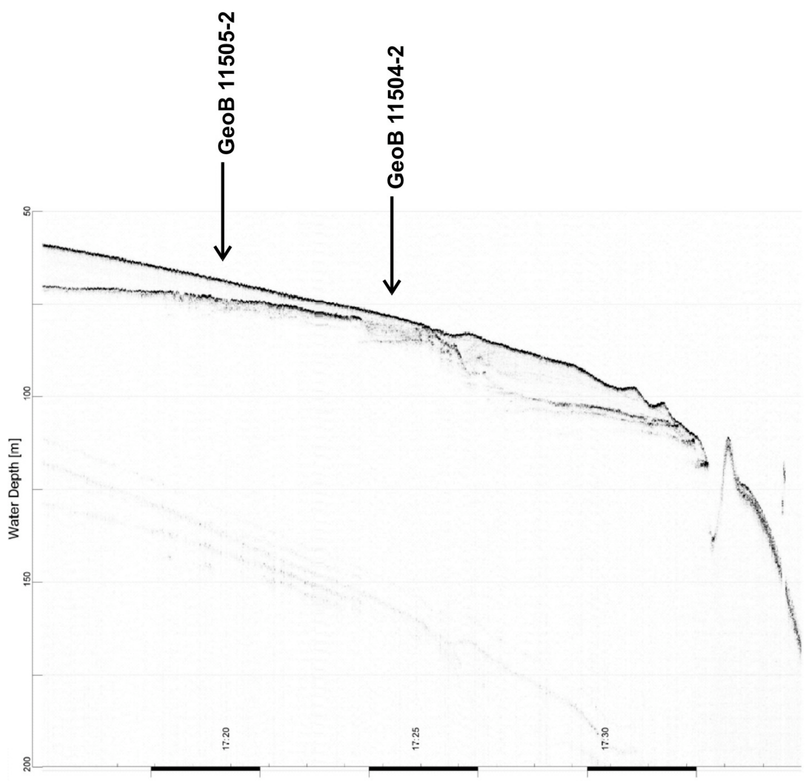


Fig. 14: Position of vibro-cores in the Timiris mud belt.

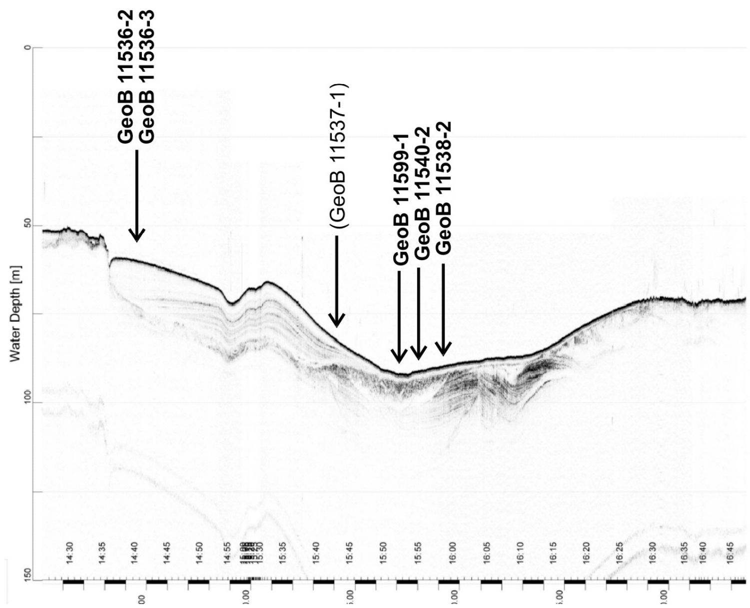


Fig. 15: Position of vibro-cores in the Arguin mud belt and the erosional features.

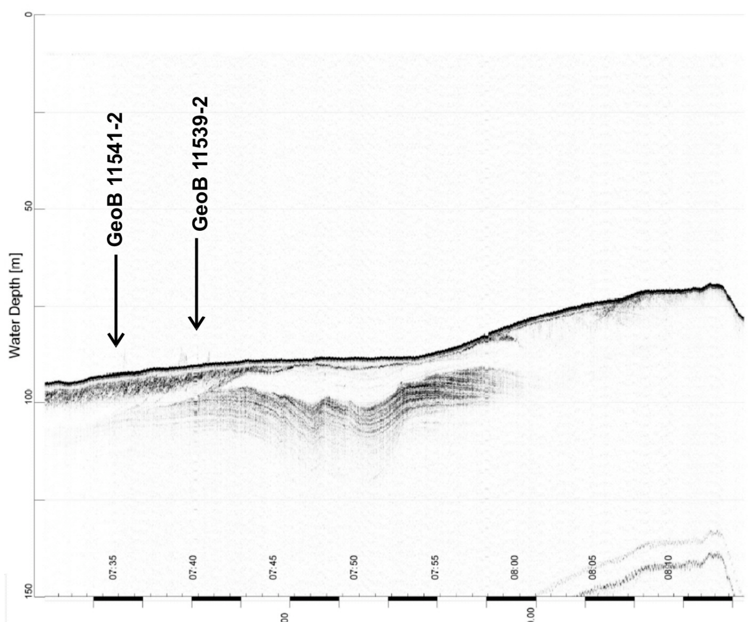


Fig. 16: Position of vibro-cores in the erosional features.

Next analytical steps

(a) Analytics in the lab

- Age dating by the radiocarbon method
- Grain-size analysis (sand, silt)
- Radiography
- XRF element scanning
- Stable isotope measurement on ostracods
- Component analysis
- Facies analysis

(b) Scientific interpretation

- Sedimentary facies interpretation with regard to the hydrological regime and coastline evolution (sea-level changes), respectively.
- Combination of resulting data with already existing core record from the *Timiris mud belt.*
- Comparison of mud belt data with terrestrial environmental records and archeological studies.
- Linkage of terrestrial history with shelf processes and depositional pattern on shelf and slope
- Facies model for the outer Golf d'Arguin in cooperation with the other cruise members by compilation of biological, calcareous and clastic surface data

6.3. Coral mounds

Markus Eisele and Karl Gürs

During Poseidon 346, two provinces of deep water carbonate mounds on the Mauritanian continental margin were surveyed: the *Banda Mound Province* (17°40'N, 16°40'W), named after the nearby Banda Gas Field and a newly described mound province that we named *Timiris Mound Province* (18°59'N, 16°52'W) after the close by Cape Timiris. The mounds were identified by low-resolution echo sounder profiles (Fig. 17) and sampled with the CTD unit, the Van Veen grab sampler, the box corer and the gravity corer. Grab samples, box cores and gravity cores were taken from the very tops of the mounds. Additionally one station (GeoB 11557) was located in the surrounding hemipelagic sediments near the mounds (off-mound) for reference.

The Banda Mound Province

The Banda mounds are located in water depths between 450 and 550 m. On the echo sounder, the Banda Mounds appear as conical build-ups with moats around their feet and thus show shapes typical for carbonate mounds covered by cold-water coral (Fig. 17). They reach heights of up to ~100 m above the surrounding sea floor.

Ten box cores and ten gravity cores were taken in the Banda Mound Province. The sediments are dominated by olive grey, clayey to silty, fine sands with varying contents of coral rubble and other bioclasts (Fig. 18 A and B). The fauna on the mounds shows a high biodiversity abundant corals (dominantly *Lophelia*, but *Madrepora* and *Dendrophyllia* are also present). Almost all corals retrieved were dead, with the exception of core GeoB 11564-1 where six living coral polyps (*Lophelia*) were found (Fig. 18 C.).

A conspicuous feature of the box cores is the high abundance of the bivalve *Acesta*. Other organisms typical for the Banda Mounds are ophiuroids, gorgonians, bryozoans, hydrozoans, sponges, crabs, squat lobsters, tube worms, and gastropods.

Fig. 17: Echo sounder profile of one of the Banda mounds

A 

B 

C 

Fig. 18: Examples of box cores from the Banda Mound province. (a) Upper surface, mud facies. (b) Upper surface, coral rubble facies with red gorgonian and a squat lobster. (c) Live polyps of *Lophelia*.

The Timiris Mound Province

The Timiris Mounds are located in depths similar to the Banda mounds further to the north. The echo sounder images of the Timiris Mounds again show typical patterns of cold-water coral covered carbonate mounds (Fig. 19). The mounds in this province also reach heights of some 100 m above the surrounding seafloor, comparable to those in the Banda Mound Province.

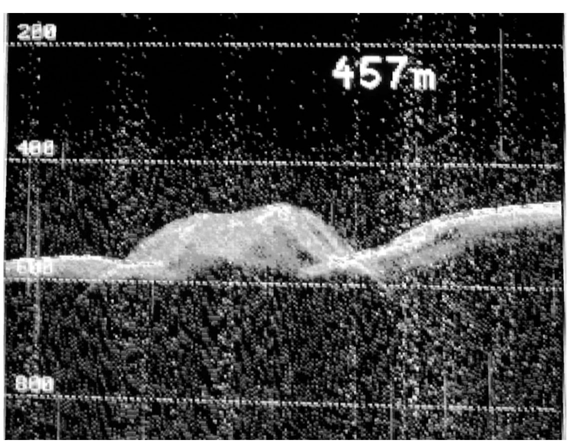


Fig. 19: Echo-sounder profile of a mound in the Timiris Mound Province.

Two box corers and two gravity cores were retrieved in the Timiris Mound Province. Sediments here are mainly composed of olive silty sand mixed with varying amounts of coral rubble (mainly *Lophelia* and abundant *Madrepora*) and other bioclasts (*Acesta*, agglutinated worm tubes, gastropods shells, and bryozoans) (Fig. 20). No live corals were found in the Timiris Mound Province. The fauna is composed of sponges, hydrozoans, bryozoans, snails, sea anemones and tube worms. One blade of seaweed was found in box core GeoB 11588-1.

A 

B 

C 

Fig 20: Box cores from the Timiris Mound Province. (a) Surface of box core, sand-/ coral-rubble facies. (b) Surface of box core, sandy facies. (c) Seaweed in core GeoB 11588-1.

The faunal composition on the Mauritanian mounds differs pronouncedly from that of the coral mounds of the northern North Atlantic. For example the bivalve dominating the northern mounds, *Asperarca nodulosa* (Müller, 1776), and one of the most abundant gastropods *Amphissa acuticostata* (Philippi, 1844) are absent in the Mauritanian provinces.

A spectacular finding was that of some lazarus species including the gastropods *Cancellaria contorta* (Basterot, 1825) and *Narona lyrata* (Brocchi, 1814). These species are common in the Tertiary record of the North Atlantic and the Mediterranean and have vanished at the beginning of the Pleistocene. They apparently survived only in this unique habitat in the Mauritanian cold-water coral provinces.

6.4. CTD measurements

Jonas von Reumont

Introduction

A total of 34 CTD casts were performed during RV POSEIDON cruise 346 (Fig. 21). The measurements were conducted to generate profiles across deepwater coral mound structures from Cap Timiris to the Banda Mound region on the shelf slope off North Mauritania. Furthermore gradient parallel profiles in the Golf d'Arguin were carried out comprising part of the shelf and the shelf slope. The objective was to measure the characteristics of the water mass produced in the Golf d'Arguin by coastal upwelling and the Canary Current that is influencing the sedimentation of different carbonate sediments.

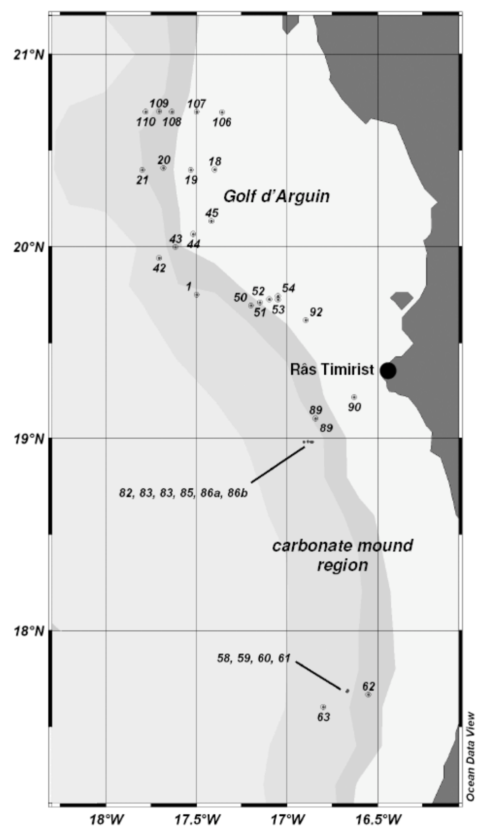


Figure 21: Overview of CTD stations in the study area.

Another objective was to study the stable isotope composition of oxygen and dissolved inorganic carbon as well as the strontium isotope composition in the water close to the sea floor on which the benthic organisms partly rely when building their skeletons. Where deeper casts were possible water samples were also taken within the water column.

Performance and Station Overview

The overall performance of the CTD was satisfactory. However, even though the recording computer worked without problems, some downcast measurements show numerous error measurement spikes within a water depth interval ranging from 10 to 100 m. The upcast measurements showed no systematic deviation from the downcast measurements but apart from individual spikes they did not replicate the error measurements and thus were chosen for further data processing. The data were processed using the Sea-Bird software "SBE Data Processing" Version 5.37d and visualized using "Ocean Data View" Version 3.2.0 (Schlitzer, R., http://odv.awi.de) (ftp://ftp.halcyon.com/pub/seabird/OUT/Seasoft-Win32/SBEDataProcessing).

The bottle release unit worked without problems, all bottles were closed reliably. During Station 63, sample bottle #5 was damaged and detached from the carousel. This accident might have been caused by the extraordinary high dolphin activity in the direct vicinity of the vessel. The bottle was replaced. Water samples were taken at all stations 10 m above seafloor (bottom alarm) and at selected stations in the water column where significant changes in the measured parameters occurred.

In the Golf d'Arguin 22 CTD stations were measured. The profiles are positioned on the shelf and the shelf slope parallel to the gradient. A total of 12 CTD profiles have been measured in the region of coral mound areas. The transects were chosen perpendicular to the elongated mound structures. The water above the mounds was sampled as close to the sediment-water interface as possible.

Preliminary results

Golf d'Arguin

The profiles are oriented approximately perpendicular to the slope gradient. The general distribution of water masses is similar in all profiles within the Golf d'Arguin. Temperature and salinity show maximum values at the surface decreasing with depth. In conjunction with coastal upwelling in this region the northernmost profile shows clearly upward sloping isotherms towards the coast down to a water depth of 300 m (Fig. 22). Some profiles show a reversion of salinity and oxygen values within the first 200 m of the deepest casts (e.g. Fig. 22). Generally decreasing temperature and salinity but increasing dissolved oxygen below approx. 400 m of water depth (Fig. 23) may indicate the influence of a deeper current mentioned by Colman et al. (2005). Between 100 to 400 m oxygen values are lowest forming an oxygen minimum layer.

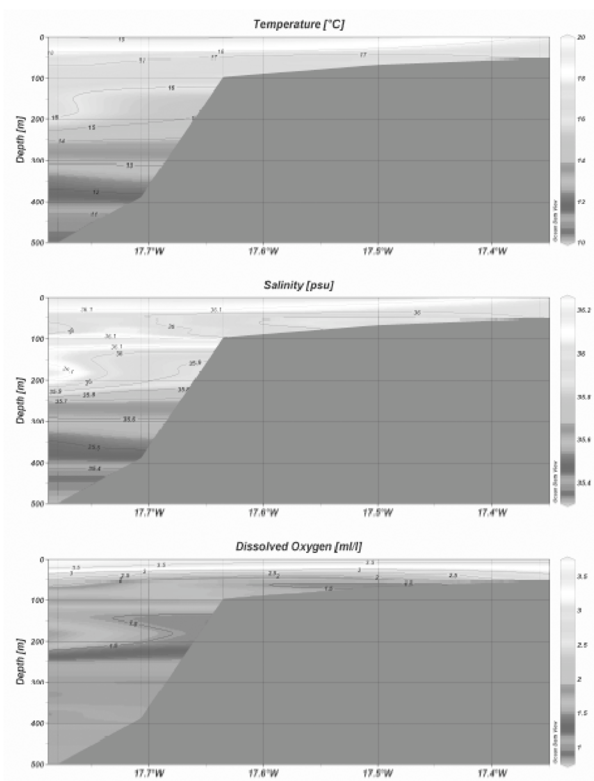


Fig. 22: Profiles of temperature (top), salinity (centre) and dissolved oxygen (bottom) comprising stations 30 to 34.

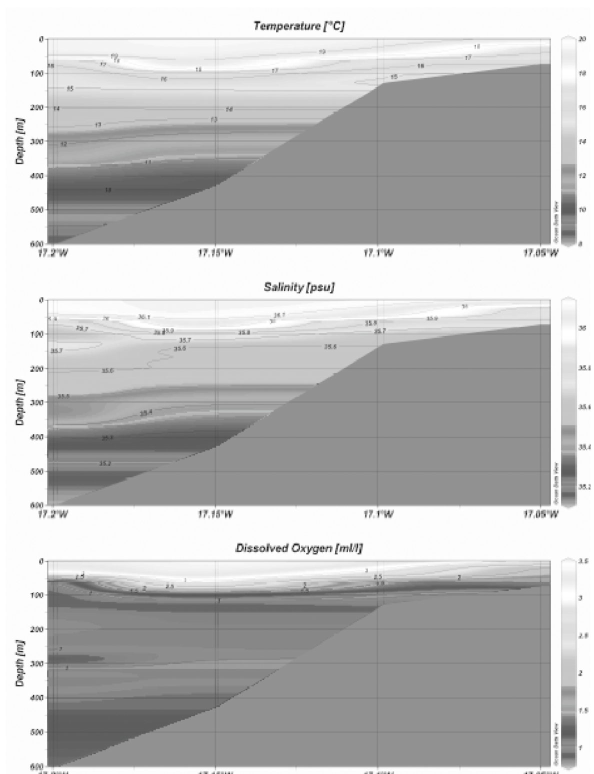


Fig. 23: Profiles of temperature (top), salinity (centre) and dissolved oxygen (bottom) comprising stations 50 to 54.

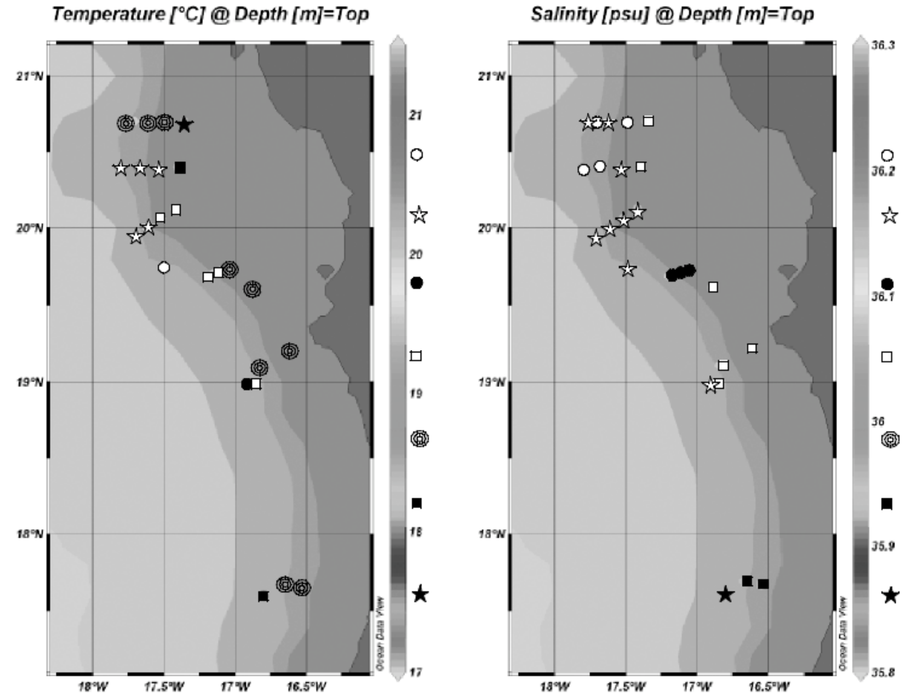


Fig. 24: Surface plots of temperature (left), salinity (right) of the entire working area.

Fig. 24 shows the distribution of sea surface temperature (SST) in the entire working area. In the north where upwelling water is expected to invade the Golf d'Arguin, SSTs are lowest, ranging from 17 to 19 °C. From 21°30.00 to 19°45.00 the measurements show an increase in temperature reaching 21 °C in the western segments of the profiles. Further south a continuous cooling of surface water down to 18 °C occurs. Salinity is highest in the north ranging from 36.3 to 36.0 psu with a general positive gradient from east to west. In contrast to temperature there is no increase in sea surface salinity between 21°30.00 to 19°45.00 but a continuous overall decrease from north to south down to 35.8 psu.

The T-S diagram of the Golf d'Arguin region (Fig. 25) shows the meridional changes in surface and near surface waters as a considerable spreading of data values. Below 800 m of water depth the diagram seems to indicate the admixture of a colder and more saline water mass.

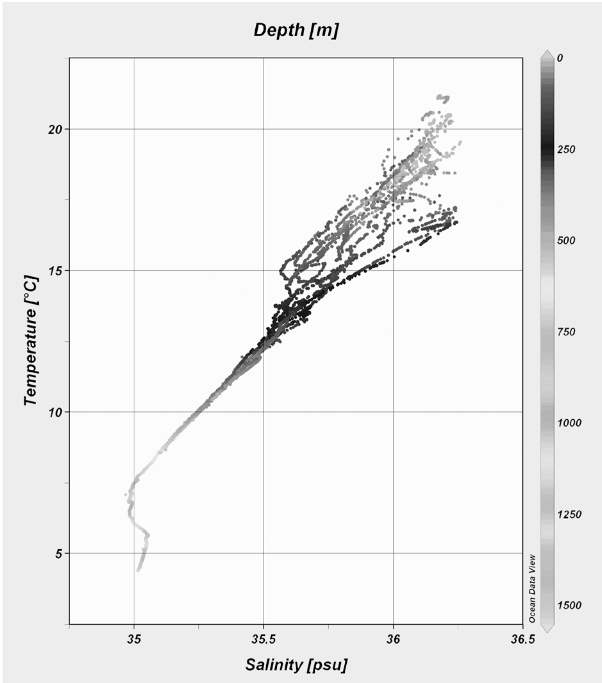


Fig. 25: T-S diagram of CTD measurements in the Golf d'Arguin region.

Carbonate mound region

12 CTD casts were conducted at the location or in the vicinity of carbonate mound structures (Banda Mound and Timiris Mound provinces). The measurements of temperature and salinity show a horizontally well-stratified water column with highest values at the surface and a decrease with depth. Compared to the Golf d'Arguin, a more pronounced thermocline is developed in the mound regions (Figs. 26 and 27) representing less mixing of the water column. Furthermore the oxygen gradient in the upper 100 m is slightly steeper and the minimum zone extends to a greater depth. Below 600 m of water depth a pronounced increase of oxygen values is observed. Apparently the oxygen minimum layer is also represented by the bending of the curve in the T-S diagram of the carbonate mound region (Fig. 28) that roughly correlates with the depth of the upper part of this layer.

Except for slightly higher temperature and salinity values above the mound top compared to lateral values there are now local anomalies associated with the carbonate mound structures.

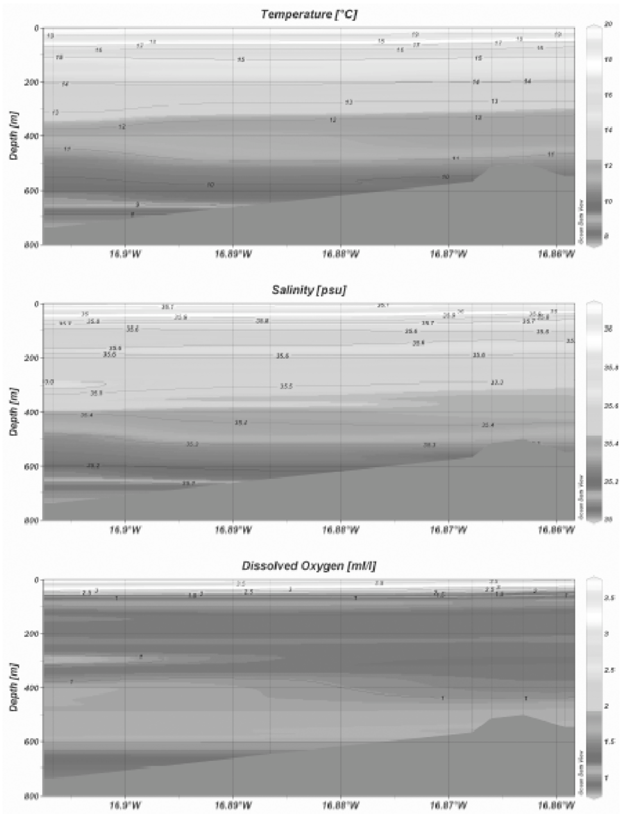


Fig. 26: Profiles of temperature (top), salinity (centre) and dissolved oxygen (bottom) comprising stations 82 to 86b.

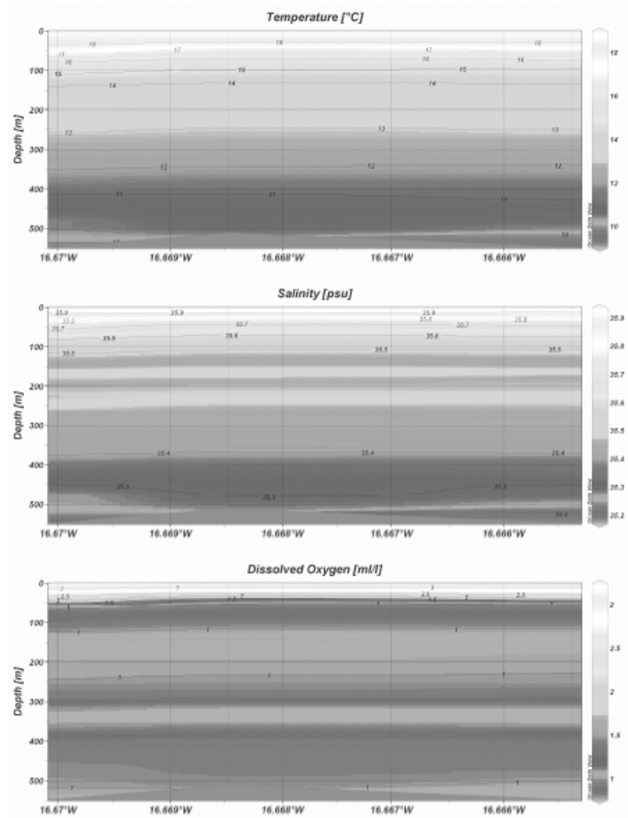


Fig. 27: Profiles of temperature (top), salinity (centre) and dissolved oxygen (bottom) comprising stations 59 to 61.

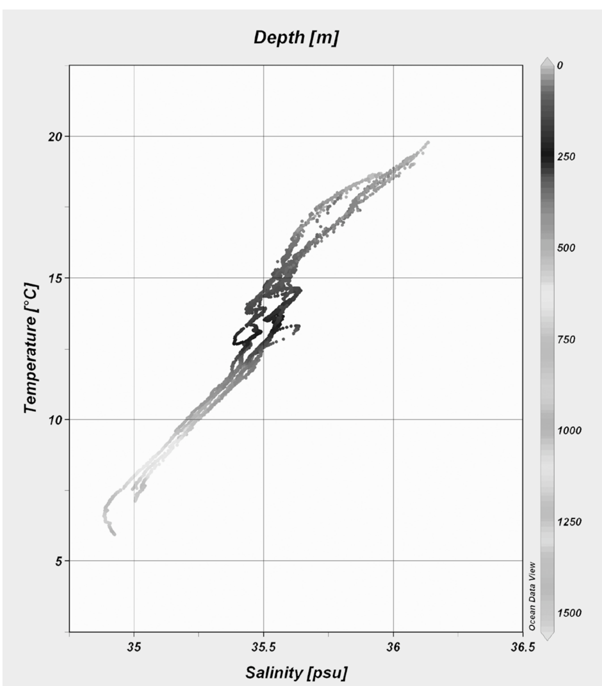


Fig. 28: T-S diagram of CTD measurements in the carbonate mound area south of Cape Timiris.

7. Weather and Meteorological Conditions

Generally, the conditions during the cruise were calm with low to no waves, which was particularly important for operating the vibro-corer. However, storms (Jan. 2nd; 11th) interrupted the work process, and we had to terminate the work on 11. of Jan. and thus 24h earlier than planned, and returned to Las Palmas. These storms were attributed to the Harmattan, a Northeast trade wind. The effect of these winter storms on the Saharan hinterland was apparent even under calm weather conditions by extreme dust loading of the air, for several days restricting visibility to less than 1 mile.

Generally, the sea was rougher in the mornings and calmed down around noon. The afternoons on many days were entirely lacking any waves.

On Jan. 10th and 11th, we experienced humid and rainy weather.

Fig. 29: Landsat image from January 1st, 2007 illustrating the dust storm R/V Poseidon experienced. (http://rapidfire.sci.gsfc.nasa.gov/gallery/?2007001-0101/WestAfrica.A2007001.1455.1km.jpg)

8. Acknowledgements

The Scientific Shipboard Party aboard RV Poseidon during POS 346 gratefully acknowledges the friendly cooperation and very efficient technical support of Captain Michael Schneider, his officers and crew who substantially contributed to the overall scientific success of this cruise. We also appreciate the great help of the Leitstelle in Kiel, namely Tom Müller. RCOM supported this cruise technically and logistically (Götz Ruhland and others). The work was funded by the German Science Foundation through project We 2493-MACUYS, HERMES, and ship time to HW and AF.

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Appendix B: Stations list

Station number	GeoB-number	Date	Time begin of station	Latitude	Longitude	Water depth	Tool
POS 346-01	115-01	30.12.2006	21:43	19°45.0000	017°29.9900	1550,0	CTD
POS 346-02-1	115-02-1	31.12.2006	8:15	19°40.2468	016°57.9678	58,0	GBC
POS 346-02-2	115-02-2	31.12.2006	8:15	19°40.2540	016°57.9372	58,0	GC
POS 346-03-1	115-03-1	31.12.2006	9:25	19°41.0448	016°59.1438	67,0	GBC
POS 346-03-2	115-03-2	31.12.2006	9:25	19°41.0442	016°59.1480	67,0	GC
POS 346-04-1	115-04-1	31.12.2006	10:16	19°39.7050	016°59.1348	75,0	GBC
POS 346-04-2	115-04-2	31.12.2006	10:16	19°39.6810	016°59.1252	74,0	GC
POS 346-05-1	115-05-1	31.12.2006	11:21	19°39.6648	016°58.2360	64,0	GBC
POS 346-05-2	115-05-2	31.12.2006	11:21	19°39.6612	016°58.2210	64,0	GC
POS 346-46-1	115-46-1	31.12.2006	13:07	19°39.7662	017°00.6372	104,0	VVG
POS 346-46-2	115-46-2	31.12.2006	13:07	19°39.7422	017°00.6030	103,0	VVG
POS 346-06	115-06	31.-01.01.2007					ESR
POS 346-07-1	115-07-1	01.01.2007	9:55	19°44.4888	017°03.0360	73,0	VVG
POS 346-07-2	115-07-2	01.01.2007	9:55	19°44.4918	017°03.0228	73,0	GBC
POS 346-07-3	115-07-3	01.01.2007	9:55	19°44.4858	017°03.0282	73,0	GC
POS 346-08-1	115-08-1	01.01.2007	11:10	19°43.5000	017°05.9952	129,0	VVG
POS 346-08-2	115-08-2	01.01.2007	11:10	19°43.5102	017°05.9700	128,0	GBC
POS 346-09-1	115-09-1	01.01.2007	12:55	19°42.4938	017°42.4938	370,0	GBC
POS 346-10-1	115-10-1	01.01.2007	14:06	19°41.5572	017°12.0222	600,0	GBC
POS 346-10-2	115-10-2	01.01.2007	14:06	19°41.5752	017°11.9982	598,0	GC
POS 346-11	115-11	01.01.2007	16:00	19°42.5718	017°09.3462	454,0	VVG
POS 346-11A	115-11A	01.01.2007	17:49	19°46.9908	017°03.9888	22,7	VVG
POS 346-11B	115-11B	01.01.2007	19:10	19°50.5398	017°11.9580	24,2	VVG
POS 346-11C	115-11C	01.01.2007	19:58	19°55.0290	017°12.4440	27,1	VVG
POS 346-11D	115-11D	01.01.2007	20:57	20°00.0222	017°14.9952	26,1	VVG
POS 346-11E	115-11E	01.01.2007	21:56	20°19.0302	017°19.0302	28,3	VVG
POS 346-11F	115-11F	01.01.2007	22:41	20°06.3720	017°21.0618	27,4	VVG
POS 346-11G	115-11G	01.01.2007	23:19	20°09.0162	017°22.5420	27,1	VVG
POS 346-13-1	115-13-1	02.01.2007	12:46	20°33.0080	017°12.0408	31,3	VVG
POS 346-13-2	115-13-2	02.01.2007	12:46	20°33.9852	017°12.0300	31,2	GBC
POS 346-14-1	115-14-1	02.01.2007	14:24	20°38.0130	017°07.0428	19,0	GBC
POS 346-15-1	115-15-1	02.01.2007	15:41	20°40.9998	017°02.0262	16,8	GBC
POS 346-15-2	115-15-2	02.01.2007	15:41	20°40.9728	017°02.0160	16,1	VL
POS 346-16-1	115-16-1	02.01.2007	17:12	20°43.9980	016°57.2010	9,1	GBC
POS 346-17-1	115-17-1	02.01.2007	18:10	20°41.9650	017°02.0310	17,3	VL
POS 346-18	115-18	02.01.2007	22:12	20°24.05	017°23.94	39,1	CTD
POS 346-19	115-19	02.01.2007	23:28	20°23.90	017°31.91	58,0	CTD
POS 346-20	115-20	03.01.2007	0:46	20°24.43	017°40.98	143,0	CTD
POS 346-21-1	115-21-1	03.01.2007	2:00	20°23.9070	017°47.9562	559,0	CTD
POS 346-21-2	115-21-2	03.01.2007	7:59	20°24.0612	017°48.0108	560,0	GBC
POS 346-21-3	115-21-3	03.01.2007	7:59	20°24.0102	017°47.9988	557,0	GC
POS 346-22-1	115-22-1	03.01.2007	10:22	20°24.5262	017°41.0058	151,0	GBC
POS 346-23-1	115-23-1	03.01.2007	11:57	20°23.9712	017°31.9950	59,0	GBC
POS 346-24-1	115-24-1	03.01.2007	13:16	20°23.9820	017°23.9478	38,5	VVG
POS 346-24-2	115-24-2	03.01.2007	13:16	20°23.9220	017°23.9178	38,4	GBC
POS 346-24-3	115-24-3	03.01.2007	13:16	20°23.8938	017°23.9028	39,1	GBC
POS 346-25-1	115-25-1	03.01.2007	15:28	20°29.7528	017°16.5438	34,1	VVG
POS 346-25-2	115-25-2	03.01.2007	15:28	20°29.6598	017°16.5480	33,1	GBC
POS 346-13-3	115-13-1	03.01.2007	16:48	20°33.9360	017°12.0432	31,4	VL
POS 346-26-1	115-26-1	03.01.2007	19:16	20°42.4620	017°07.9838	25,2	VVG
POS 346-27-1	115-27-1	03.01.2007	19:58	20°41.9940	017°04.9740	15,8	VVG
POS 346-28-1	115-28-1	03.01.2007	20:45	20°38.0058	017°01.9778	18,0	VVG
POS 346-29-1	115-29-1	03.01.2007	21:35	20°36.5202	017°04.9578	19,0	VVG
POS 346-30-1	115-30-1	03.01.2007	22:27	20°33.5232	017°09.0120	28,9	VVG
POS 346-31-1	115-31-1	04.01.2007	0:13	20°27.4500	017°14.4288	30,8	VVG
POS 346-32-1	115-32-1	04.01.2007	1:00	20°23.4498	017°14.5668	31,0	VVG
POS 346-33-1	115-33-1	04.01.2007	2:06	20°17.9448	017°19.0452	34,0	VVG
POS 346-34-1	115-34-1	04.01.2007	2:49	20°19.4220	017°21.0780	29,0	VVG
POS 346-35-1	115-35-1	04.01.2007	3:44	20°13.9302	017°22.5582	32,0	VVG
POS 346-36-1	115-36-1	04.01.2007	8:04	20°03.5808	017°28.9020	54,0	GBC
POS 346-37-1	115-37-1	04.01.2007	8:50	20°05.4852	017°32.5812	78,0	VVG
POS 346-38-1	115-38-1	04.01.2007	9:17	20°05.0628	017°33.6612	86,0	VVG
POS 346-39-1	115-39-1	04.01.2007	9:35	20°04.8828	017°34.0332	88,0	GBC
POS 346-40-1	115-40-1	04.01.2007	10:09	20°04.3722	017°33.1650	85,0	VVG
POS 346-41-1	115-41-1	04.01.2007	10:29	20°03.7878	017°33.2748	85,0	VVG
POS 346-41A-1	115-41A-1	04.01.2007	11:10	20°01.3932	017°34.3530	171,0	VVG
POS 346-41A-2	115-41A-2	05.01.2007	11:10	20°01.3728	017°34.3542	178,0	VVG
POS 346-41B	115-41B	04.01.2007	12:01	20°01.5000	017°31.4718	75,0	VVG
POS 346-41C	115-41C	04.01.2007	12:32	20°03.0300	017°33.8118	89,0	VVG

Appendix B: Stations list

Station number	GeoB-number	Date	Time begin of station	Latitude	Longitude	Water depth	Tool
POS 346-41D	115-41D	04.01.2007	13:26	20°00.6888	017°36.1332	329,0	VVG
POS 346-41E	115-41E	04.01.2007	14:14	20°00.8838	017°38.1990	502,0	VVG
POS 346-36-2	115-36-2	04.01.2007	16:02	20°03.5850	017°28.9500	54,0	GC
POS 346-38-2	115-38-2	04.01.2007	16:53	20°05.0910	017°33.6780	86,0	VL
POS 346-39-2	115-39-2	04.01.2007	17:55	20°04.9212	017°33.9702	87,0	VL
POS 346-40-2	115-40-2	04.01.2007	18:53	20°04.4058	017°33.1392	85,0	VL
POS 346-42-1	115-42-1	04.01.2007	23:56	19°56.4600	017°42.4200	296,0	CTD
POS 346-43-1	115-43-1	05.01.2007	1:19	19°59.8800	017°36.9900	624,0	CTD
POS 346-44-1	115-44-1	05.01.2007	3:13	20°03.9552	017°31.0362	69,0	CTD
POS 346-45-1	115-45-1	05.01.2007	4:33	20°07.9692	017°25.0038	31,0	CTD
POS 346-47-1	115-47-1	05.01.2007	8:02	20°25.5600	017°12.9802	25,6	BG
POS 346-48-1	115-48-1	05.01.2007	9:23	20°20.5272	017°16.9858	28,0	BG
POS 346-49-1	115-49-1	05.01.2007	10:35	20°17.0238	017°21.6708	28,9	BG
POS 346-36-3	115-36-3	05.01.2007	15:12	20°03.6700	017°29.0300	54,0	VL
POS 346-99-1	115-99-1	05.01.2007	16:22	20°04.7500	017°33.1700	85,0	VL
POS 346-41-2	115-41-2	05.01.2007	17:11	20°03.9390	017°33.2190	85,0	VL
POS 346-50	115-50	05.01.2007	22:10	19°41.5500	017°11.9100	597,0	CTD
POS 346-51	115-51	05.01.2007	23:07	19°42.5500	017°08.9400	424,0	CTD
POS 346-52	115-52	05.01.2007	23:55	19°43.5500	017°05.9000	128,0	CTD
POS 346-53	115-53	06.01.2007	0:36	19°43.4900	017°03.0100	90,0	CTD
POS 346-54	115-54	06.01.2007	1:10	19°44.4900	017°03.0000	73,0	CTD
POS 346-55	115-55	06.01.2007					ESR
POS 346-56	115-56	06.01.2007					ESR
POS 346-58	115-58	06.01.2007	20:15	17°41.4000	016°39.9270	482,0	CTD
POS 346-59	115-59	06.01.2007	20:54	17°41.0009	016°40.1988	544,0	CTD
POS 346-60	115-60	06.01.2007	21:25	17°41.0052	016°40.1070	480,0	CTD
POS 346-61	115-61	06.01.2007	21:57	17°41.1000	016°39.9222	548,0	CTD
POS 346-62	115-62	06.01.2007	23:31	17°39.9700	016°33.0500	195,0	CTD
POS 346-63	115-63	07.01.2007	1:40	17°36.1400	016°47.9700	1030,0	CTD
POS 346-64-1	115-64-1	07.01.2007	7:57	17°38.7510	016°39.9888	467,0	GBC
POS 346-64-2	115-64-2	07.01.2007	7:57	17°38.7528	016°39.9552	442,0	GC
POS 346-65-1	115-65-1	07.01.2007	9:29	17°38.9928	016°39.7512	456,0	GBC
POS 346-65-2	115-65-2	07.01.2007	9:29	17°39.0000	016°39.7380	440,0	GC
POS 346-66-1	115-66-1	07.01.2007	10:41	17°39.0078	016°40.0842	441,0	GBC
POS 346-66-2	115-66-2	07.01.2007	10:41	17°39.0000	016°40.0722	441,0	GC
POS 346-67-1	115-67-1	07.01.2007	13:00	17°39.5100	016°40.0668	428,0	GBC
POS 346-67-2	115-67-2	07.01.2007	13:00	17°39.4968	016°40.0338	429,0	GC
POS 346-57-1	115-57-1	07.01.2007	14:22	17°41.2458	016°39.7392	478,0	GBC
POS 346-57-2	115-57-2	07.01.2007	14:22	17°41.2470	016°39.7340	477,0	GC
POS 346-70-1	115-70-1	07.01.2007	23:56	17°56.9760	016°28.9080	158,0	BG
POS 346-71-1	115-71-1	08.01.2007	0:52	17°52.9728	016°28.9542	157,0	BG
POS 346-72-1	115-72-1	08.01.2007	1:47	17°48.0120	016°29.0100	153,0	BG
POS 346-73-1	115-73-1	08.01.2007	2:39	17°43.9842	016°29.0352	148,0	BG
POS 346-74-1	115-74-1	08.01.2007	3:23	17°39.9888	016°28.9890	138,0	VVG
POS 346-75-1	115-75-1	08.01.2007	4:00	17°40.0182	016°31.0050	167,0	VVG
POS 346-76-1	115-76-1	08.01.2007	4:39	17°39.9912	016°33.0450	194,0	VVG
POS 346-77-1	115-77-1	08.01.2007	5:12	17°39.9972	016°35.0460	246,0	VVG
POS 346-68-1	115-68-1	08.01.2007	8:14	17°39.8562	016°40.3542	514,0	GBC
POS 346-68-2	115-68-2	08.01.2007	8:14	17°39.8550	016°40.3608	493,0	GC
POS 346-69-1	115-69-1	08.01.2007	9:30	17°40.0080	016°40.3230	440,0	GBC
POS 346-69-2	115-69-2	08.01.2007	9:30	17°40.0062	016°40.3272	444,0	GC
POS 346-78-1	115-78-1	08.01.2007	10:30	17°40.5132	016°40.2012	458,0	GBC
POS 346-78-2	115-78-2	08.01.2007	10:30	17°40.5162	016°40.2060	453,0	GC
POS 346-79-1	115-79-1	08.01.2007	12:51	17°40.7658	016°40.0842	452,0	GBC
POS 346-79-2	115-79-2	08.01.2007	12:51	17°40.7628	016°40.1040	450,0	GBC
POS 346-79-3	115-79-3	08.01.2007	12:51	17°40.7688	016°40.0980	451,0	GC
POS 346-80-1	115-80-1	08.01.2007	14:28	17°41.0388	016°40.0782	481,0	GBC
POS 346-80-2	115-80-2	08.01.2007	14:28	17°40.9932	016°40.0662	483,0	GC
POS 346-81-1	115-81-1						ESR
POS 346-82-1	115-82-1	09.01.2007	2:02	18°58.9800	016°54.4000	734,0	CTD
POS 346-83-1	115-83-1	09.01.2007	3:08	18°59.0300	016°53.1900	643,0	CTD
POS 346-84-1	115-84-1	09.01.2007	4:03	18°58.9800	016°52.0700	566,0	CTD
POS 346-85-1	115-85-1	09.01.2007	4:39	18°58.9900	016°51.9600	483,0	CTD
POS 346-86A-1	115-86A-1	09.01.2007	5:10	18°58.9800	016°51.7800	465,0	CTD
POS 346-86B-1	115-86B-1	09.01.2007	5:44	18°58.9700	016°51.5500	536,0	CTD
POS 346-88-1	115-88-1	09.01.2007	8:01	18°58.9920	016°51.8178	474,0	GBC
POS 346-87-1	115-87-1	09.01.2007	8:42	18°58.9950	016°51.9348	482,0	GBC
POS 346-87-2	115-87-2	09.01.2007	8:42	18°58.9938	016°51.9192	482,0	GC
POS 346-89-1	115-89-1	09.01.2007	10:52	19°06.3948	016°50.5050	860,0	CTD

Station number	GeoB-number	Date	Time begin of station	Latitude	Longitude	Water depth	Tool
POS 346-90-1	115-90-1	09.01.2007	15:15	19°13.0020	016°37.6902	65,0	CTD
POS 346-91A	115-91A	09.01.2007	17:15	19°44.1900	016°04.7920	3.5 to 5	BD
POS 346-91B	115-91B	09.01.2007	17:15	19°44.1900	016°04.7920	3.5 to 5	BD
POS 346-91C	115-91C	09.01.2007	17:15	19°44.1900	016°04.7920	3.5 to 5	BD
POS 346-92-1	115-92-1	09.01.2007	20:40	19°37.0000	016°53.7900	33,8	CTD
POS 346-93-1	115-93-1	09.01.2007	21:39	19°43.4868	016°57.2748	23,3	VVG
POS 346-94-1	115-94-1	09.01.2007	22:15	19°44.4888	016°59.9748	33,0	VVG
POS 346-95-1	115-95-1	09.01.2007	22:54	19°45.8100	017°02.0040	37,2	VVG
POS 346-96-1	115-96-1	09.01.2007	23:30	19°47.2938	017°05.7750	55,0	VVG
POS 346-97-1	115-97-1	10.01.2007	8:39	20°42.7338	017°03.5328	11,1	VVG
POS 346-97-2	115-97-2	10.01.2007	8:39	20°42.7418	017°03.5438	11,3	VVG
POS 346-100-1	116-01-1	10.01.2007	9:30	20°42.4992	016°59.0112	12,2	VVG
POS 346-100-2	116-01-2	10.01.2007	9:30	20°42.4920	016°58.9620	12,1	VL
POS 346-101-1	116-02-1	10.01.2007	11:11	20°38.1638	017°03.9642	17,6	VVG
POS 346-102-1	116-03-1	10.01.2007	12:05	20°42.2238	017°02.7670	20,2	VVG
POS 346-103-1	116-04-1	10.01.2007	13:31	20°48.9042	017°00.9960	11,8	VVG
POS 346-104-1	116-05-1	10.01.2007	15:13	20°45.1812	017°03.4638	11,0	VVG
POS 346-104-2	116-05-2	10.01.2007	15:13	20°45.1812	017°03.4638	12,1	VVG
POS 346-104-3	116-05-3	10.01.2007	15:13	20°45.2010	017°03.4632	11,0	VL
POS 346-98-1	116-06-1	10.01.2007	16:47	20°43.1730	017°02.7930	20,1	VVG
POS 346-105-1	116-07-1	10.01.2007	17:30	20°45.4858	016°59.1000	13,6	VVG
POS 346-106-1	116-08-1	10.01.2007	23:59	20°41.9400	017°21.5000	52,0	CTD
POS 346-107-1	116-09-1	11.01.2007	1:14	20°42.0600	017°29.9300	67,0	CTD
POS 346-108-1	116-10-1	11.01.2007	2:38	20°41.9800	017°38.0800	97,0	CTD
POS 346-109-1	116-11-1	11.01.2007	3:15	20°42.1000	017°42.4100	389,0	CTD
POS 346-110-1	116-12-1	11.01.2007	4:26	20°42.0300	'°46.7500+F35	498,0	CTD
POS 346-111-1	116-13-1	11.01.2007	8:10	20°41.9780	017°38.1918	98,0	VVG
POS 346-111-2	116-13-2	11.01.2007	8:10	20°42.0030	017°38.1930	99,0	GBC
POS 346-111-3	116-13-3	11.01.2007	8:10	20°42.8228	017°38.1848	100,0	VL
POS 346-112-1	116-14-1	11.01.2007	10:50	20°42.9550	017°29.9958	68,0	VVG
POS 346-112-2	116-14-2	11.01.2007	10:50	20°42.9550	017°29.9958	67,0	GBC

GBC=giant box corer; GC=Gravity corer; VL=vibrocorer; VVG=Van Veen grab; BD=bucked dredge (dinghy); ESR=echo sounder reconnaissance

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1. Wochenbericht
28.12.2006-3.1.2007

Die MACUMA Forschungsfahrt auf FS Posiedon befaßt sich mit dem gemischt karbonatisch-siliziklastischen Ablagerungssystemen auf dem Schelf und Schelfhang von NW-Afrika vor Mauretanien (Banc d'Arguin und westlich Nouakchott). Das Arbeitsgebiet liegt imTropengürtel (17-21°N), jedoch im Einfluß von Kanarenstrom und einer Upwelling-Front, so daß sich kein typisch tropisches Karbonatablagerungssystem mit zooxanthellaten Riffen ausgebildet hat. Stattdessen kommen atypische tropische Karbonate ohne zooxanthellate Korallen und Grünalgen vor. Auf dem Schelfhang vor Mauretanien befinden sich als weiteres Element des Ökosystems wenig bekannte Tiefwasserriffe. Weiterhin ist das gemischt kabonatisch-siliziklastische System für die Klimarekonstruktion des Quartärs von Bedeutung, wie Vorarbeiten an einem Kern von der südlichen Banc d'Arguin zeigen.

Die Fragestellungen für diese Ausfahrt umfassen:
- Erfassung und Beschreibung dieses rezenten atypischen tropischen Karbonatablagerungssystems (Sedimentologie, Taxonomie, Geochemie, Ozeanographie)
- Untersuchung der Tiefwasserriffe am Kontinentalhang
- Untersuchung der quartären Klimaentwicklung anhand von (fluviatilen und äolischen) siliziklastischen sowie karbonatischen Sedimentkomponenten.

28.12.2006
Auslaufen um 9:00; Transit zur ersten Station (knapp 62 h Transit-Zeit).

30.12.2006
Station 1 um 22:45: CTD (vor der Schelfkante, mittlere Banc d'Arguin; 1550 m). Das Temperatur- und das Salinitätsprofil zeigen deutlich den nur 50 m mächtigen Kanarenstrom.

31.12.2006
Stationen 2-5, südliche Banc d'Arguin. Lage in einem Mudbelt. Es wurden GKG und SL gefahren, der Kerngewinn war sehr gut. Das Material ist dunkel, siltig und relativ reich an Mollusken. Eine zusätzliche Station wurde westlich des Mudbelt gefahren, um das Vibrolot auszuprobieren. Der vorweggeschickte Backengreifer war allerdings leer. Das Vibrolot hatte eine technische Panne, so daß die Station abgebrochen wurde. Um 15:00 war Arbeitsende wegen Feiertages. Nachts wurde ein Echolotprofil gefahren (Station 6).

1.1.2007
Stationen 7-10 bilden ein Profil senkrecht zur Schelfkante nördlich des Mudbelt auf der südlichen Banc d'Arguin. Stationen 7 und 8 wurden mit Backengreifer und mit GKG beprobt. Stationen 9 und 10 wurden mit GKG beprobt. Das Sediment ist anoxisch und riecht nach H_2S. Die Fauna spiegelt nährstoffreiche Bedingungen wieder. Mehrere Kerne brachten lebende Fische mit an Deck. Der GKG von Station 9 enthält Solitärkorallen und Bruchstücke von *Madrepora*. Eine neue Station 11 wurde festgelegt, die auf einer Erhebung im Echolot positioniert ist und nahe Station 9 liegt, um zu testen, ob es sich um einen Korallenmound handelt. Der Backengreifer kam allerdings fast leer hoch.
Stationen 11A-11G bilden ein BG-Profil in gut 20 m Wassertiefe parallel der Schelfkante von dem Mudbelt nach Norden zum nächsten geplanten Arbeitsgebiet (Paläo-Valley-Positionen). Das Material ist ein schlickartiger, gut sortierter Feinsand, ist zum Teil sehr dunkel und hat

einen starken H_2S-Geruch. Es ist reich an Würmern und Wurmröhren, jedoch arm an großen Karbonatschalern. Wieder kamen Fische in den Kernen mit an Deck. Der Fischreichtum der Region ist auch durch extrem hohe Anteile an Otolithen, Schuppen und Knochen manifestiert.

2.1.2007
In der Nacht kam ein starker Wind (Harmatan) mit Windstärke 8 auf und verzögerte die Arbeiten. So mußten die für die Nacht geplanten CTD-Stationen 11H-K verschoben werden. Nach Nachlassen des Windes wurden entlang eines Profils in flachen Gewässern (<50 m) bei Cap Blanc im Norden der Banc d'Arguin GKG-Kerne genommen. Im Norden der Banc d'Arguin strömt das kalte Wasser von Kanarenstrom und Upwelling auf die Banc d'Arguin. Die gewonnenen Kerne bestehen aus sauberen, hellen karbonatischen Schillen, die reich an Bivalven sind. Zwei Versuche, Vibrolot-Kerne zu nehmen, scheiterten.

3.1.2007
In der Nacht vom 2. auf den 3. Januar wurde ein CTD-Profil senkrecht zum Hang im Norden der Banc d'Arguin gemessen und Wasserproben genommen. An den CTD-Stationen wurden am Tag GKG- und SL/VL-Kerne gezogen.

Der Saharastaub hat bereits das ganze Schiff rötlich eingezuckert. Die Stimmung an Bord ist sehr gut, und die Arbeiten gehen zügig voran.

Dr. Hildegard Westphal
Fahrtleiterin auf FS Poseidon

Poseidon 346 MACUMA
2. Wochenbericht
4.-10.1.2007

In der zweiten Woche von Pos 346 wurden die Arbeiten im Bereich der Banc d'Arguin fortgesetzt. In der zweiten Hälfte der Woche verlagerten wir unser Arbeitsgebiet weiter nach Süden und untersuchten die Tiefwasser-Korallenmounds westlich Nouakchott.

4.1.2007
In der Nacht vom 3. auf den 4. Januar wurde das Nord-Süd-Profil entlang der 30 m-Isobathe der Banc d'Arguin mit 10 Backengreifer-Stationen vervollständigt, die im Norden auch in flachere Wässer (Eingang zu Baie du Levrier) reichten. Ein Trend zu einem höheren Anteil and grobkörnigem Karbonat nach Norden ist deutlich. Die Stationen am Eingang der Baie du Levrier zeigen zum Teil Grobschill, zum Teil gut sortierte Sande mit hohem Quarz-Anteil. Weiter nach Süden zeigt das Sediment eine dunkle Färbung und ist sehr feinkörnig.
Während des Tages wurden sechs Stationen auf der mittleren Banc d'Arguin beprobt, die im Bereich eines vermuteten Paläo-Valleys liegen. Aufgrund der Windverhältnisse konnte das Vibrolot erst am späten Nachmittag eingesetzt werden, so daß alle Stationen über Tag zuerst mit Backengreifer bzw. Kastengreifer beprobt wurden. Am späten Nachmittag konnten an drei der Stationen ein Schwerelot- und zwei Vibrolotkerne gezogen werden.

5.1.2007
In der Nacht vom 4. auf den 5. Januar wurden im mittleren Bereich der Banc d'Arguin ein CTD-Profil senkrecht zum Kontinentalhang gefahren. Wieder zeigte sich der Kanarenstrom deutlich in der Salinitäts- und Temperaturkurve.
Am Morgen des 5. Januar wurde das 30m-Isobathen-Profil mit Backengreifer-Stationen verdichtet. Anschließend wurden drei weitere Vibrolot-Kerne im Paläo-Valley gezogen. Danach verließen wir das Arbeitsgebiet Banc d'Arguin.

6.1.2007
Gegen Mittag erreichten wir die Banda-Mounds westlich Nouakchott. Zuerst wurden Echolotprofil-Raster gefahren, um die Korallenmounds exakt zu lokalisieren, die zum Teil weniger als 200 m breit sind. Das Echolot zeigte die Mounds sehr klar nicht nur durch ihre auffallende Morphologie, sondern auch durch die unscharfe Reflexion, die auf weichen Untergrund hinweist.

7.1.2007
In der Nacht vom 6. auf den 7. Januar wurden auf der Basis der Echolotprofile sechs CTD-Stationen gefahren. In dieser Nacht wurde unser Schiff von einer rund 50-köpfigen Delphinherde begleitet.
Am 7. Januar wurden fünf Großkastengreifer-Schwerelot-Stationen gefahren, die auf den Gipfeln der Korallenmound-Kette der Banda-Mounds positioniert waren. Die Kerne waren spektakulär in der Menge an (zum Teil lebenden) *Lophelia* und anderen Korallen. Die Muschel *Acesta*, die bislang nur aus weiter nördlich gelegenen Gebieten bekannt war, kam ebenfalls vor.

8.1.2007
In der Nacht vom 7. auf den 8. Januar wurden westlich der Banda-Mounds acht Backengreifer-Stationen gefahren. Die Stationen waren in einer Linie rund 150 m

Wassertiefe hangparallel und anschließend senkrecht den Kontinentalhang abwärts auf die Banda-Mounds zu positioniert.
Am 8. Januar wurden fünf weitere Großkastengreifer-Schwerelot-Stationen entlang der Moundkette auf den Gipfeln der Mounds gefahren. Die Kerne waren fortgesetzt spektakulär, insbesondere auch durch massenhaftes Auftreten von *Acesta*. Allerdings wurden keine weiteren lebenden Exemplare von *Lophelia* gefunden. An diesem Tag sahen wir zum ersten Mal den Horizont, der uns bislang von Sahara-Staub verhangen wurde.

9.1.2007
In der Nacht vom 8. auf den 9. Januar fuhren wir von den Banda Mounds zu den nördlichsten der Mounds in der Kette vor Nouakchott. Dort wurden Echolote gefahren, um die Korallenmounds zu lokalisieren. Danach wurden CTD-Stationen im Bereich dieser Mounds gefahren.
Am Morgen des 9.1. wurden die Korallenmounds mittels Großkastengreifer und Schwerelot beprobt. Während des anschließenden Transit zurück zur Banc d'Arguin wurden drei CTD-Profile gemessen, zwei davon in einem Gully, der den Kontinentalrand durchschneidet, eine in 40 m Wassertiefe am Rand des Südendes der Banc d'Arguin.
Anschließend wurde bei extrem ruhiger See und ruhigem Wetter ein mit vier Leuten besetztes Schlauchboot ausgesetzt, um Sedimentproben in dem Flachstwasserbereich östlich des Mudbelt der südlichen Banc d'Arguin zu nehmen. Das Schlauchboot legte rund eine Meile zurück, um in diese flachsten Bereiche zu gelangen. Die Strömung war mit geschätzten 1.5 m/s recht stark. Beprobung mittels einer Eimerdredge förderte sauberen groben Karbonatsand zutage.

10.1.2007
In der Nacht vom 9. auf den 10. Januar wurden nordöstlich des Mudbelt in rund 15 m Wassertiefe weitere Backgengreiferproben genommen, um den Datensatz zu ergänzen. Anschließend fuhren wir zur Baie du Levrier, wo ab dem Morgen Backengreifer- und Vibrolot-Stationen in Wassertiefen um 10 m gefahren wurden. Das Sediment ist überwiegend ein ausgewaschener Karbonatsand mit viel Schill, was die hohen Strömungsgeschwindigkeiten in der Baie du Levrier widerspiegelt. Bei klarer Sicht arbeiteten wir den ganzen Tag mit Blick auf Cap Blanc.

Die Arbeiten gehen weiterhin zügig voran, und die Resultate sind durchweg erfreulich.

Dr. Hildegard Westphal
Fahrtleiterin auf FS Poseidon

Poseidon 346 MACUMA
3. Wochenbericht
11.-15.1.2007

11.1.2007
In den verbleibenden zwei Arbeitstagen sollten letzte Arbeiten auf der südlichen Banc d'Arguin und dem vorgelagerten Schelfhang durchgeführt werden. In der Nacht vom 10. auf den 11. Januar wurde ein CTD-Transekt vor Cap Blanc in Ost-West-Richtung mit Wassertiefen von 50-500 m gemessen, um den Einstrom von Auftriebs- und Kanarenstrom-Wassermassen auf die Banc d'Arguin zu erfassen. Am Morgen des 11. Januar sollten die drei flachsten dieser Stationen (50-10 m Wassertiefe) mittels Vibrolot beprobt werden. Nach der ersten dieser Stationen brieste es stark auf; um 10:30 h wurden wegen Windstärke 8 die Arbeiten unterbrochen. Um 11:00 hatte der Wind bis auf Stärken von 9-10 zugenommen, so daß alle Arbeiten abgebrochen werden mußten und der Rücktransit nach Las Palmas begonnen wurde.

11.-14.1.2007
Transit Arbeitsgebiet-Las Palmas, zum Teil bei starkem Wind.

14.1.2007
Einlaufen um 9:00 und damit 24 h früher als geplant in Las Palmas.

Trotz des Abbruchs der Arbeiten verliefen alle drei Unterprojekte der Fahrt POS 346 (atypische Flachwasserkarbonate, quartäre Klimaentwicklung, Tiefwasserriffe) äußerst erfolgreich, was nicht nur die Menge an Daten- und Probenmaterial betrifft. Die Zusammenarbeit zwischen Mannschaft und Wissenschaftlern war sehr gut, die Stimmung ebenso. Unser herzlicher Dank geht an Kapitän Michael Schneider, ohne den diese Fahrt niemals so erfolgreich hätte werden können, an den Ersten Horst Hagen, an Bootsmann Achim Mischker und an die gesamte Mannschaft.

Dr. Hildegard Westphal
Fahrtleiterin auf FS Poseidon

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